ECONOMIC ANALYSIS OF THE PROPOSED RULE TO MODIFY REPORTING OF LEAD AND LEAD COMPOUNDS UNDER EPCRA SECTION 313

Economic and Policy Analysis Branch
Economics, Exposure and Technology Division
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency

May 1999

NOTE

This is not an official guidance document and should not be relied upon to determine applicable regulatory requirements. This document was prepared to provide economic information for the rulemaking process, and to meet various administrative and legislative requirements. Due to the nature of the information available to EPA, the document contains various assumptions that may not reflect the reporting determinations that an individual facility would make, were it to apply the reporting requirements to its specific processes and circumstances.

Persons seeking information on regulatory requirements as they apply to specific facilities should consult 40 CFR Part 372; the preambles for regulatory actions implemented under section 313 of the Emergency Planning and Community Right-to-Know and section 6607 of the Pollution Prevention Act; EPA's "Toxic Chemical Release Inventory Reporting Forms and Instructions"; guidance documents that EPA has published for specific chemicals and industries; "EPCRA Section 313 Questions and Answers, Revised 1998 Version"; and the Emergency Planning and Community Right-to-Know Information Hotline.

CONTRIBUTORS

Analytical and draft preparation support for completion of this report was provided by Abt Associates Inc. of Cambridge, Massachusetts under EPA Contract No. 68-W98-005.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

SUMMARY

S.1 INTRODUCTION

Under section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), and section 6607 of the Pollution Prevention Act (PPA), certain facilities are required to file annual reports to the United States Environmental Protection Agency (EPA) and to states on their releases, transfers, and other waste management practices for certain toxic chemicals if they are manufactured, processed, or otherwise used above certain threshold amounts. This information is included in a publicly available database known as the Toxic Release Inventory (TRI).

The reporting thresholds under section 313(f)(1) of EPCRA are 25,000 pounds for chemicals that are manufactured or processed and 10,000 pounds for chemicals that are otherwise used. Section 313(f)(2) authorizes EPA to revise these reporting thresholds. Under the proposed rule, EPA will revise the reporting thresholds for lead and lead compounds, based on their persistence and bioaccumulation in the environment.

S.2 NEED FOR THE RULE

For certain chemicals, such as those that persist in the environment and bioaccumulate, important information about releases and other waste management activities may not be available to the public because facilities manufacture, process or otherwise use the chemicals at levels below the current TRI reporting thresholds. Since persistent bioaccumulative toxic (PBT) chemicals can remain in the environment for a significant amount of time and can accumulate in animal tissues, even relatively small releases of such chemicals from individual facilities may have significant adverse effects on human health and the environment. This situation results in a market failure. Markets fail to achieve socially efficient outcomes when differences exist between market values and social values. Two causes of market failure are externalities and information asymmetries.

In the case of negative externalities, the actions of one party impose costs on other parties that are "external" to any market transaction. For example, a facility may release toxic chemicals without accounting for the consequences to other parties, such as the surrounding community, and the prices of that facility's goods or services will fail to reflect those costs.

The market may also fail to efficiently allocate resources in cases where consumers lack information. For example, when toxic release information is insufficient, individuals' choices regarding where to live and work may not be the same as if they had more complete information. Since firms ordinarily have little or no incentive to provide information on their releases and other waste management activities involving toxic chemicals, the market fails to allocate society's resources in the most efficient manner.

Federal regulations exist, in part, to address significant market failures. In cases where the market is unlikely to provide adequate information, public intervention can provide consumers and possibly producers with information that will allow them to make better decisions. The proposed rule addresses the market failures arising from private choices lead and lead compounds that have societal costs, and the market failures created by the limited information available to the public about the releases and other waste management of lead and lead compounds.

Certain facilities currently report TRI data on lead and lead compounds under the existing 10,000 and 25,000 pound reporting thresholds. The proposed rule addresses additional facilities that do not currently report lead and lead compounds to TRI because they do not exceed current reporting thresholds for lead and lead compounds, and/or because the lead-containing materials they handle are currently covered by the *de minimis* exemption.

S.3 PROPOSED ACTIONS

EPA is proposing to lower reporting thresholds for lead and lead compounds, based on their persistence and bioaccumulation in the environment. This proposed action is described below in more detail.

S.3.1 LOWER REPORTING THRESHOLDS

The regulatory options that EPA evaluated were created by varying the reporting thresholds from their current levels of 25,000 pounds for manufacture and processing, and 10,000 pounds for otherwise use of EPCRA section 313 chemicals. EPA considered the following options for reporting of lead and lead compounds to TRI:

- **Option 1.** Reporting threshold of 1 pound of lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 2.** Reporting threshold of 10 pounds lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 3.** Reporting threshold of 100 pounds lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 4.** Reporting threshold of 1,000 pounds lead and/or lead compounds manufactured, processed or otherwise used.

S.3.2 OTHER PROPOSED ACTIONS

EPA has proposed a number of other modifications to the reporting of lead and lead compounds beyond the lowering of reporting thresholds.

De Minimis Exemption

For lead and lead compounds, EPA is proposing to eliminate the *de minimis* exemption. The current reporting requirements allow facilities to disregard certain low concentrations of chemicals in mixtures or other trade name products in making threshold determinations for TRI reporting. This *de minimis* exemption applies to mixtures and trade name products that are imported, manufactured as an impurity, processed, or otherwise used.

Alternate Threshold and Form A

EPA is proposing to require facilities to file a Form R report when they meet reporting criteria for lead and lead compounds with lower reporting thresholds. Current reporting rules allow facilities to file a Form A instead of a Form R if they have less than 500 pounds of production-related waste of a listed toxic chemical and do not manufacture, process, or otherwise use more than one million pounds of that listed toxic chemical. The Form A is a certification statement; the release, transfer, and waste management information reported on the Form A is more limited than that provided by the Form R.

Range Reporting

EPA is proposing to require facilities to report numerical values for releases and off-site transfers for waste management of lead and lead compounds. EPA currently allows facilities to use range codes in reporting less than 1,000 pounds of releases and off-site transfers for further waste management.

Half-pound Rule and Whole Number Reporting

For lead and lead compounds, EPA is proposing that all releases or other waste management quantities of greater than a tenth of a pound be reported, provided that the appropriate activity threshold has been exceeded and the underlying data support this level of precision. EPA is also proposing that for release and other waste management quantities less than ten pounds, fractional quantities (*e.g.*, 6.2 pounds) rather than whole numbers would be reported. EPA currently requires that facilities report numerical quantities as whole numbers. EPA also currently allows facilities to round releases of 0.5 pounds or less to zero. Under the proposed action, releases and other waste management activities would continue to be reported to two significant digits.

Reporting Limitation for Lead and Lead Compounds in Alloys

Lead and lead compounds can be found in various types of alloys used at facilities which are subject to reporting under section 313. EPA is proposing to limit the reporting for lead and lead compounds by excluding brass, bronze, or stainless steel alloys that contain the metal from the reporting thresholds. Under this limitation, once incorporated into an alloy, lead and lead compounds would not be reportable. Cutting, grinding, shaving, and other activities involving a brass, bronze, or stainless steel alloy would not negate the reporting limitations for these alloys that contain lead and lead compounds, but manufacture of the alloys would be reportable.

S.4 ESTIMATED REPORTING ACTIVITY

In 1996, EPA received TRI data on the release and other waste management of over a billion pounds of lead and lead compounds from approximately 1,600 facilities. The industry groups reporting the largest amounts of release or other waste management of lead and lead compounds in 1996 were Electronic and Other Electrical Equipment and Components (SIC 36); Primary Metal Industries (SIC 33); Rubber and Miscellaneous Plastics Products (SIC 30); Stone, Clay, Glass, and Concrete Products (SIC 32); and Fabricated Metal Products (SIC 34).

The numbers of additional TRI reports for lead and lead compounds under four regulatory options are summarized in Table S-1. Under Option 2, the preferred option as presented in the regulation text, approximately 15,000 additional reports on lead and lead compounds are predicted as a result of the proposed rule. Approximately 47 percent of these reports are triggered by the consumption of fuel (primarily coal and residual fuel oil) at manufacturing facilities and electric utilities. These fuels contain lead and lead compounds, and facilities that use sufficient amounts of fuel may exceed the lower reporting threshold.

TABLE S-1
ESTIMATED NUMBER OF ADDITIONAL REPORTS FOR LEAD & LEAD COMPOUNDS

SIC Code - Industry Group	Number of Reports (Annual)			
	Option 1	Option 2 (Preferred)	Option 3	Option 4
12 - Coal mining	321	321	321	321
29 - Petroleum refining and related industries	1,033	117	91	90
3241 - Cement, hydraulic	123	123	123	123
33 - Primary metal industries	1,130	1,130	1,109	842
367 - Electronic components and accessories	4,033	4,033	3,109	405
371 - Motor vehicles and motor vehicle equipment	2,862	2,862	1,485	201
4911/4931/4939 - Electric services	414	378	319	248
4953 - Refuse systems (RCRA subtitle C only)	80	74	64	36
5171 - Petroleum bulk stations and terminals	2,459	980	621	55
7389 - Solvent recovery services	26	24	22	14
20-39 - Other manufacturing; industrial combustion	10,142	5,001	1,498	570
Total	**22,623**	**15,043**	**8,762**	**2,905**

S.5 COSTS OF THE PROPOSED RULE

The proposed rule will result in the expenditure of resources that, in the absence of the regulation, could be used for other purposes. The cost of the proposed rule is the value of these resources in their best alternative use. Most of the costs of the proposed rule result from requirements on industry.

S.5.1 PRIVATE INDUSTRY COSTS

To estimate the industry costs of compliance, the unit cost for each task that a subject facility may be required to perform as a result of the proposed rule is multiplied by the relevant

number of facilities or reports associated with that task. Table S-2 displays the industry costs for each regulatory option based on the estimated number of facilities affected and the estimated number of additional reports.

Under the option presented in the regulation text (Option 2), approximately 15,000 facilities will submit additional Form R reports annually. As shown, aggregate industry costs in the first year for the proposed alternative are estimated to be $116 million; in subsequent years they are estimated to be $60 million per year. Industry costs are lower after the first year because facilities will be familiar with the reporting requirements, and many will be able to expedite reporting by updating or modifying information from the previous year's report.

TABLE S-2
SUMMARY OF REPORTING AND ASSOCIATED COST TO INDUSTRY

Regulatory Options	Annual Number of Reporting Facilities	Estimated Industry Costs ($ million per year)	
		First Year	Subsequent Years
Option 1	22,623	174	91
Option 2 (Preferred Option)	15,043	116	60
Option 3	8,762	67	35
Option 4	2,905	22	12

Some of the facilities potentially affected by this proposed rule may also be affected by the proposed PBT rule (January 5, 1999; 64 FR 688). If these rules are finalized as proposed, certain facilities may file additional reports on lead or lead compounds, as well as on one or more of the PBT chemicals from the earlier proposal. The ultimate outcome of these separate proposals is, however, uncertain at present. Therefore, certain facility-specific reporting costs have been included in this economic analysis and in the economic analysis of the PBT proposal—even though these costs can be incurred only once per facility. Upon finalization, the aggregate cost of the two proposals may be less than the sum of the industry costs shown in the economic analyses of these proposals due to this potential double-counting of reporting costs. Under the preferred options presented in the regulatory text of this and the previous proposal, the potential double-counting of industry costs amounts to $4 million in the first year of reporting only.

S.5.2 COSTS TO PUBLICLY OWNED FACILITIES

There are an estimated 39 publicly-owned coal- and oil-fired electric utility plants that will be affected by the proposed rule. Under Option 2, 36 of these facilities are estimated to submit a total of 36 reports at a cost of approximately $190,000 in the first year and $130,000 in subsequent years. These costs are reflected in the estimated industry costs shown in Table S-2.

S.5.3 EPA COSTS

EPA will incur costs as a result of the proposed rule. These costs include costs for data processing, outreach and training, information dissemination, policy and petitions, and compliance and enforcement. Under Option 2, EPA is expected to expend $1.6 million in the first year, and $1.2 million in subsequent years as a result of the proposed rule.

S.5.4 SUMMARY OF COSTS

The estimated total cost of the proposed rule is $118 million in the first year and $61 million in subsequent years. Table S-3 summarizes the total costs to industry and EPA of the proposed rule.

TABLE S-3
SUMMARY OF TOTAL COSTS OF PROPOSED RULE (Option 2)

DESCRIPTION	First Year ($ million)	Subsequent Years ($ million)
Industry Costs	116	60
EPA Costs	1.6	1.2
TOTAL COSTS	118	61

S.6 IMPACTS OF THE PROPOSED RULE

S.6.1 IMPACTS ON SMALL ENTITIES

The proposed rule may affect both small businesses and small governments. For analytical purposes, EPA defined a "small" business using the small business size standards established by the Small Business Administration (SBA). The SBA small business size standards are expansive, classifying most businesses as "small." (For example, the SBA size standard is 500 employees for approximately 75 percent of the manufacturing industries, and either 750, 1,000 or 1,500 for the remaining manufacturing industries, which would mean that more than 98.5 percent of all manufacturing firms are classified as small businesses.) EPA defined "small" governments using

the RFA definition of jurisdictions with a population of less than 50,000. No small organizations are expected to be affected by the proposed rule. Only those small entities that are expected to submit at least one report are considered to be affected for the purpose of the small entity analysis. The number of affected entities will be smaller than the number of affected facilities, because some entities operate more than one facility.

Small Businesses

This analysis uses annual compliance costs as a percentage of annual company sales to assess the potential impacts of the rule on small businesses. This is a good measure of a firm's ability to afford the costs attributable to a regulatory requirement, because comparing compliance costs to revenues provides a reasonable indication of the magnitude of the regulatory burden relative to a commonly available and stable measure of a company's business volume. Where regulatory costs represent a small fraction of a typical firm's revenue, the financial impacts of the regulation are likely to be minimal.

For the first reporting year, all 5,620 potentially affected small businesses may bear annual compliance costs of less than 1 percent of revenues, and no small businesses will bear annual costs greater than 1 percent of annual revenues. Similarly, in subsequent years, all 5,620 small businesses are predicted to face annual compliance costs of less than 1 percent of annual revenues, and no small businesses will bear annual costs greater than 1 percent of annual revenues. Impact percentages based on annual costs after the first year are the best measure to judge the impacts on small entities because these continuing costs are more representative of the costs firms face to comply with the proposed rule.

Small Governments

It is estimated that 36 publicly owned electric utility facilities, operated by a total of 34 municipalities, may be affected. Of these, an estimated 18 are operated by small governments (i.e., those with populations under 50,000). To assess the potential impacts on small governments, EPA used annual compliance costs as a percentage of the utility's annual revenues to measure potential impacts. Similar to the methodology for small businesses, this measure was used because it provides a reasonable indication of the magnitude of the regulatory burden relative to a government's ability to pay for the costs, and is based on readily available data. None of the 18 small government-owned utilities will bear costs greater than 1 percent of annual revenues in either the first or subsequent reporting years.

S.6.2 IMPACTS ON CERTAIN DEMOGRAPHIC GROUPS

By lowering the section 313 reporting thresholds for lead and lead compounds, EPA will provide communities across the United States (including low-income populations and minority populations) with access to data that may assist them in lowering exposures and consequently reducing chemical risks for themselves and their children. This information can also be used by government agencies and others to identify potential problems, set priorities, and take appropriate steps to reduce any potential risks to human health and the environment. Therefore, the

informational benefits of the proposed rule will have a positive effect on the human health and environment of minority populations, low-income populations, and children.

S.7 BENEFITS OF THE PROPOSED RULE

In enacting EPCRA and PPA, Congress recognized the significant benefits of providing information on the presence, release and waste management of toxic chemicals. TRI has proven to be one of the most powerful forces empowering the federal government, state and local governments, industry, environmental groups and the general public to fully participate in an informed dialogue about the environmental impacts of toxic chemicals in the United States. TRI enables interested parties to establish credible baselines, to set realistic goals for environmental progress over time, and to measure progress in meeting these goals. The TRI system is a neutral yardstick by which progress can be measured.

The proposed rule to expand reporting on lead and lead compounds is intended to build upon past success of TRI. Under current reporting thresholds, important information about the releases and other waste management activities involving lead and lead compounds is not being captured by the TRI. By lowering reporting thresholds for lead and lead compounds, EPA will assure that the public will have access to such data.

The benefits of the proposed rule are related to the provision and distribution of additional information on lead and lead compounds, and include improvements in understanding, awareness, and decision-making. The information reported to TRI increases knowledge of the levels of pollutants released to the environment and the potential pathways of exposure, thereby improving scientific understanding of the health and environmental risks of toxic chemicals; allowing the public to make better-informed decisions on matters such as where to work and live; enhancing the ability of corporate leaders and purchasers to gauge a facility's potential environmental liabilities; and assisting federal, state, and local authorities in making better decisions on acceptable levels of toxic chemicals.

Moreover, providing information can lead to follow-on activities that create additional costs and benefits. These follow-on activities, including reductions in releases of and changes in the waste management practices for toxic chemicals, yield health and environmental benefits. These changes in behavior come at some cost, and the net benefits of the follow-on activities are the difference between the benefits of decreased chemical releases and transfers and the costs of the actions needed to achieve the decreases.

Because the state of knowledge about the economics of information is not highly developed, EPA has not attempted to quantify or monetize the benefits of changing reporting thresholds for lead and lead compounds. Furthermore, because of the inherent uncertainty in the subsequent chain of events, EPA has also not attempted to predict the changes in behavior that result from the information, or the resultant net benefits, (i.e., the difference between benefits and costs). EPA's benefit analysis, however, does provide illustrative examples of how the proposed rule will improve the availability of information on lead and lead compounds.

CHAPTER 1
BACKGROUND, STATEMENT OF NEED, STATUTORY AUTHORITY AND OVERVIEW OF ANALYSIS

The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), created a broad range of emergency response planning and reporting requirements for manufacturers, processors, and users of toxic chemicals in the United States. Under section 313 of EPCRA, certain facilities are required to submit annual reports to the United States Environmental Protection Agency (EPA) and to States on their release(s), transfer(s), and waste management activities for certain toxic chemicals if they are manufactured, processed, or otherwise used above thresholds amounts. In addition, the Pollution Prevention Act (PPA) of 1990 requires these same facilities to report prevention, recycling, and other waste management information for these same chemicals. EPA maintains the data collected under EPCRA section 313 and the PPA in a database known as the Toxics Release Inventory (TRI).[1]

EPCRA section 313(f)(1) contains default reporting thresholds for facilities. These reporting thresholds are 25,000 pounds for toxic chemicals that are manufactured (including imported) or processed, and 10,000 pounds for toxic chemicals that are otherwise used. Facilities that meet these reporting thresholds, as well as other reporting criteria, are required to submit annual reports. EPA has determined that lower reporting thresholds are appropriate for lead and lead compounds because these chemicals persist and bioaccumulate in the environment. In addition, EPA is proposing other modifications to ensure meaningful reporting of lead and lead compounds.

This report analyzes the economic effects of modifying EPCRA section 313 reporting requirements for lead and lead compounds. To understand the effects of the proposed rule, however, it is first necessary to understand how EPCRA section 313 and TRI currently operate. This chapter provides a description of the statutory and regulatory history of TRI, followed by a summary of the TRI reporting requirements and how the data have been used. The chapter concludes with a description of the need for TRI, and the statutory authority for expanding the program.

[1] The term *EPCRA section 313* properly refers to only the statutory requirements, while the term *TRI* properly refers to the database where the information collected under section 313 and under section 6607 of the PPA is stored. However, the terms have often been used interchangeably by the public to refer to the statute, the regulatory requirements, the reporting form, the database, and EPA's program to manage the data. In deference to common usage, the terms EPCRA section 313 and TRI are sometimes used interchangeably in this report where doing so will make the report simpler and easier to read.

1.1 STATUTORY AND REGULATORY HISTORY

1.1.1 PASSAGE OF EPCRA

In 1986, Congress passed EPCRA, which is also known as Title III of SARA. The law was passed in response to the accidental release of methyl isocyanate gas in Bhopal, India in December, 1984, and a number of chemical accidents in the U.S., including one in Institute, West Virginia. These accidental releases highlighted the dearth of information available to the public about toxic chemicals being manufactured, processed, used and transported within their communities. EPCRA is based on the premise that the public has the right to know about chemical uses, as well as routine and accidental releases. The broad purposes are to encourage planning for response to accidental chemical releases as well as daily management of routine releases, and to provide the public and government agencies with information about the presence, release and management of toxic chemicals.

EPCRA contains four main provisions:

- Planning for chemical emergencies (sections 301-303);
- Emergency notification of chemical accidents and releases (section 304);
- Reporting of hazardous chemical inventories (sections 311-312); and
- Toxic chemical release reporting (section 313).

Because the rule is being proposed under section 313 (and not the other sections of EPCRA), the remainder of this overview deals only with section 313 (i.e., TRI).

1.1.2 OVERVIEW OF TRI

The regulations implementing EPCRA section 313 were promulgated on February 16, 1988 (53 FR 4500) and are codified at 40 CFR Part 372. Under these regulations, owners or operators of covered facilities must complete the Toxic Chemical Release Inventory Reporting Form R, which includes information on releases to air, water and land, as well as on-site waste treatment and transfers of the chemical in or as waste to off-site locations. These reports must be submitted to EPA and the States for each calendar year, by July 1 of the following year.

A completed Form R must be submitted for each toxic chemical manufactured, processed, or otherwise used at each covered facility as described in 40 CFR Part 372. There are currently over 600 toxic chemicals and chemical compound categories on the list of TRI chemicals.

A facility must report under section 313 if it meets all three of the following criteria:

(1) It is in a Standard Industrial Classification (SIC) code covered by the regulations;

(2) It has 10 or more full-time employees (or the hourly equivalent of 20,000 hours); and

(3) It manufactures, processes, or otherwise uses any of the listed toxic chemicals or chemical categories above the applicable reporting threshold.

TRI is unique among environmental databases because of the multimedia data it collects, and because it was designed for public access. EPCRA requires that EPA "establish and maintain in a computer database a national toxic chemical inventory based on data submitted to the Administrator." The Administrator shall make the data available by computer, telecommunication, and other means to any person on a cost reimbursable basis. EPA maintains the section 313 data in the national Toxics Release Inventory (TRI) database. TRI data are available to the public in a variety of paper and electronic formats, including disk, on-line, and CD-ROM.

Section 313(h) of EPCRA states that data obtained pursuant to section 313 are intended to provide information to the public as well as to Federal, State, and local governments. "These data shall be used to inform the public about releases to the environment of the listed chemicals; to assist government agencies, researchers, and other persons conducting research and gathering data; to aid in the development of appropriate regulations, guidelines, and standards; and for other similar purposes."

1.1.3 POLLUTION PREVENTION ACT

In 1990, Congress passed the Pollution Prevention Act (PPA), adopting as national policy an environmental hierarchy establishing pollution prevention as the first choice among waste management options. For waste that cannot be prevented at the source, recycling is considered the next best option. Treatment or disposal should be turned to only after source reduction and recycling have been considered. Section 6607 of the PPA augmented the information available to the public under EPCRA section 313 by requiring facilities to report information on their pollution prevention, recycling and other waste management activities on Form R. The data elements required by the Pollution Prevention Act are contained in section 8 of the Form R.

1.1.4 CHANGES TO THE LIST OF CHEMICALS

When Congress passed EPCRA it gave EPA an initial list of approximately 300 chemicals and chemical categories subject to TRI reporting. The statutory list was derived from

chemical lists used in New Jersey and Maryland. Congress also included a provision in EPCRA to amend the list of chemicals. Under section 313(d), EPA has the authority to add a chemical to the list if it determines that the chemical can cause or can be reasonably anticipated to cause:

- Adverse acute human health effects at concentration levels reasonably likely to exist beyond facility site boundaries as a result of continuous or frequently recurring releases;
- Cancer or teratogenic effects, serious or irreversible reproductive dysfunctions, neurological disorders, heritable genetic mutations, or other chronic health effects; or
- A significant adverse effect on the environment.

EPA has also added chemicals to the list through its authority under section 313(d). Most notably, EPA added 286 chemicals and chemical categories to the list of toxic chemicals subject to TRI on November 30, 1994 (59 FR 61432). The majority of these chemicals are pesticides. Many of the remainder are chemicals regulated or identified as concerns under other environmental statutes such as the Clean Air Act, the Clean Water Act and the Safe Drinking Water Act.

EPA may delete a chemical from the list if it does not meet any of the above criteria. According to section 313(e) of EPCRA, any person may petition EPA to add or delete a chemical from the list on the basis of whether or not it meets the above criteria. All changes to the list are made through notice-and-comment rulemaking.

1.1.5 ALTERNATE THRESHOLD

On November 30, 1994, EPA finalized the "TRI Alternate Threshold for Facilities with Low Annual Reportable Amounts" (59 FR 61488). This rule was intended to reduce the compliance burden associated with EPCRA section 313. It established a streamlined reporting option for facilities where the annual reportable amount of a listed chemical released or managed does not exceed 500 pounds.[2] Such facilities have the option of applying an alternate manufacture, process or otherwise use threshold of 1 million pounds to that chemical, instead of the standard thresholds of 10,000 or 25,000 pounds. If a facility does not exceed the 1 million pound threshold, then that facility is eligible to submit Form A for that chemical instead of Form R.

Form A is a simplified reporting form that includes facility identification information and the identity of the chemical or chemical category being reported. The Form must be submitted on an annual basis, and the information appears in the TRI data base in the same manner as information submitted on a Form R.

[2] The annual reportable amount is equal to the combined total quantities recycled, combusted for energy recovery, treated or released. It can be calculated as the sum of data elements 8.1 through 8.7 on Form R.

As described in Chapter 2, EPA is proposing to require reporting using the Form R only for lead and lead compounds.

1.1.6 EXECUTIVE ORDER 12856

On August 3, 1993, Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements" was signed by the President (58 FR 41981). The Executive Order requires federal facilities to comply with EPCRA requirements beginning with the 1994 reporting year. The Executive Order also asks all federal agencies to set a voluntary goal of 50% reduction from baseline quantities of their releases and transfers by 1999.

1.1.7 CHANGES TO THE LIST OF INDUSTRIES

On May 1, 1997, EPA added facilities in seven industry groups to the list of facilities subject to the reporting requirements of section 313 (62 FR 23833). Prior to this action, reporting was limited to facilities in the manufacturing sector (SIC codes 20-39) and federal facilities. This action added facilities in the following sectors:

- metal mining;
- coal mining;
- electric utilities;
- commercial hazardous waste treatment;
- chemicals and allied products-wholesale;
- petroleum bulk terminals and plants-wholesale; and
- solvent recovery services.

The first reports from these facilities will be submitted in 1999 and available to the public in 2000.

1.1.8 PROPOSED CHANGES FOR CERTAIN PBT CHEMICALS

On January 5, 1999, EPA proposed a rule to lower reporting thresholds for certain TRI chemicals that are of concern because of their tendency to persist and bioaccumulate (64 FR 688). For certain PBT chemicals not already currently listed, EPA proposed adding them to TRI. The Agency also proposed other concurrent changes in the program, such as eliminating the *de minimis* exemption for PBT chemicals, requiring Form R reporting, and eliminating range reporting. This rule has not been finalized as of the publication date of this report.

1.2 SUMMARY OF TRI REPORTING REQUIREMENTS

The previous section described the fundamentals of TRI reporting. This section provides a brief overview of several key requirements under the current TRI regulations. These descriptions are for the purpose of general background and are not comprehensive. This is not an official guidance document and should not be relied upon to determine applicable regulatory requirements. More information on specific requirements is available in EPA's "Toxic Chemical Release Inventory Reporting Form and Instructions", the EPCRA Section 313 Question and Answer Document; or from the Emergency Planning and Community Right-to-Know Information Hotline.

1.2.1 DEFINITION OF A FACILITY

EPCRA section 329 defines a facility to mean "all buildings, equipment, structures and other stationary items which are located on a single site or on contiguous or adjacent sites and which are owned or operated by the same person."

1.2.2 FULL-TIME EMPLOYEE DETERMINATION

Facilities are only covered by TRI if they have 10 or more full-time employees (FTE) or the equivalent (20,000 hours, where a full-time employee is defined as 2,000 work hours per year). All employees, including part-time and contract employees, must be counted in the FTE determination. Therefore, the FTE determination depends on the total number of hours worked during the year, and not on the actual number of persons working.

1.2.3 THRESHOLD DETERMINATIONS

Facilities must report to TRI if they manufacture, process, or otherwise use any of the listed chemicals above the reporting thresholds. For chemicals manufactured (including imported) or processed the current threshold is 25,000 pounds a year; for chemicals that are otherwise used the current threshold is 10,000 pounds a year. Threshold determinations for chemicals that are recycled or reused at the facility are based only on the amount of the chemical that is added during the year, not the total volume in the system. However, chemicals recycled off-site and returned to a facility are treated as the equivalent of newly purchased material.

The definitions of manufacture, process and otherwise use can be summarized as follows:

- **Manufacture** means to produce, prepare, compound or import a listed chemical, including the coincidental production as a byproduct or impurity.
- **Process** means the preparation of a listed chemical, after its manufacture, for distribution in commerce. For instance, a company that combines resins, solvents, pigments and additives to produce paint is processing the constituent chemicals.

- **Otherwise Use** encompasses any activity involving a listed chemical that does not fall under the definitions of "manufacture" or "process". For example, lubricants, cooling fluids, refrigerants, hydraulic fluids, cleaners, degreasers and catalysts are typically otherwise used by the facilities that consume them. The definition of otherwise use includes stabilization, treatment for destruction and disposal of TRI listed chemicals a facility receives from off-site for the purpose of waste management and TRI listed chemicals manufactured in the course of such waste management activities.

As described in Chapter 2, EPA is proposing to lower reporting thresholds for lead and lead compounds.

1.2.4 EXEMPTIONS

Under certain circumstances, a facility is not required to consider certain activities in its threshold and reporting calculations. The following are the current major exemptions from TRI reporting:

Use Exemptions. The following uses of listed chemicals are specifically exempted:

- **Use as a structural component of a facility.** For example, painting of the facility;
- **Use in routine janitorial or facility grounds maintenance.** Examples include bathroom cleaners and fertilizers or pesticides used to maintain lawns. The exemption applies only when the chemicals are used in the same form and concentration as commonly distributed to consumers;
- **Personal uses by employees or other persons.** For example, office supplies such as correction fluid and copier machine fluid;
- **Use for the purpose of maintaining motor vehicles operated by the facility.** This exemption includes such chemicals as brake and transmission fluids, oils and lubricants, antifreeze, batteries and cleaning solutions for purposes of motor vehicle maintenance; and
- **Chemicals contained in intake water or in intake air.** This exemption covers the use of toxic chemicals present in process water and non-contact cooling water as drawn from the environment or from municipal sources, or toxic chemicals present in air used either as compressed air or as part of combustion.

De Minimis. The amount of chemical present in a mixture or trade name product which is processed or otherwise used does not need to be counted towards threshold and reporting calculations if its concentration is less than 0.1 percent of the mixture for chemicals defined as carcinogens by the Occupational Safety and Health Administration (OSHA), or less than 1 percent of the mixture for all other chemicals. This exemption does not apply to the processing or otherwise use of TRI chemicals in waste streams because wastes are not considered to be mixtures or trade name products. The *de minimis* exemption also applies to TRI listed chemicals that are manufactured as an impurity, but does not apply to chemicals manufactured as

byproducts (e.g., a toxic chemical that is separated from a process stream). As described in Chapter 2, EPA is proposing to eliminate the *de minimis* exemption for lead and lead compounds

Transportation. EPCRA provides an exemption from section 313 for the transportation of chemicals. According to section 327, only the emergency notification requirements in section 304 apply to the transportation of chemicals or their storage incidental to transportation. The conference report for EPCRA clarifies that the exemption relating to storage is limited to materials which are still moving under active shipping papers and which have not reached the ultimate consignee.

Articles. A facility is not required to account for chemicals in articles processed or otherwise used at the facility. An article is a manufactured item: (1) that is formed to a specific shape or design during manufacture; (2) that has end use functions dependent in whole or in part upon its shape or design during end use; and (3) that does not release a toxic chemical under normal conditions of processing or otherwise use.

For example, a closed item containing a listed chemical (e.g., a starting, lighting, and ignition battery that contains lead or lead compounds) that does not release the toxic chemical during normal processing or otherwise use activities may be considered an article. However, if the facility services the item (e.g., the battery), any chemical added must be counted in threshold and reporting calculations.

Laboratory Activities. Chemicals that are used for research or quality control under the supervision of a technically qualified individual do not need to be counted. This exemption does not apply to pilot plant scale operations or laboratories that distribute chemicals in commerce.

1.2.5 USE OF READILY AVAILABLE DATA FOR REPORTING

According to section 313(g)(2) of EPCRA, no additional monitoring or measurement of quantities, concentrations, or frequency of release of any listed chemical may be required for the purpose of reporting to TRI. The required information may be obtained from readily available data that are collected pursuant to other provisions of law or as part of routine plant operations. When such data are not available, reasonable estimates, using such methods as published emission factors, materials balance calculations or engineering calculations, are sufficient.

1.2.6 OTHER

SIC Code Determination

Facilities are subject to TRI reporting if they are in a listed SIC code. This encompasses the following industry groups:

SIC Code	INDUSTRY GROUP
20-39	Manufacturing
10	Metal Mining (except 1011, 1081, 1094)
12	Coal Mining (except 1241)
4911, 4931, 4939	Electric Services (combusting coal and/or oil)
4953	Commercial Hazardous Waste Treatment (RCRA subtitle C only)
5169	Chemical and Allied Products - Wholesale
5171	Petroleum Bulk Stations and Terminals - Wholesale
7389	Solvent Recyclers only

Facilities with multiple SIC codes are covered if their primary SIC code is a listed SIC code. Some facilities have multiple establishments at the same site, with some establishments that are in SIC codes covered by TRI and others that are outside the covered SIC codes. Such facilities must calculate the value of products produced or shipped from each establishment within the facility. If establishments within covered SIC codes account for either a majority or a plurality of the total value of the products shipped from or produced at the facility, the entire facility meets the SIC code criterion. A covered multi-establishment facility must make threshold determinations and, if required, must report to TRI for the entire facility, even from establishments that are outside covered SIC codes.

Range Reporting

Facilities with total annual releases or off-site transfers of less than 1,000 pounds of a listed chemical can report these quantities in ranges (1-10 lbs, 11-499 lbs, or 500-999 lbs) instead of as point estimates. Range reporting lowers the reporting burden for these facilities. As described in Chapter 2, EPA is proposing to require point estimates for lead and lead compounds.

Recordkeeping

Facilities must keep a copy of each report filed for at least three years from the date of submission. Facilities must also maintain those documents, calculations, worksheets, and other forms upon which they relied to gather information for their reports. EPA may request documentation to support submitted information or conduct data quality reviews of submissions.

Chemical Categories

A chemical category contains several individual chemicals having similar characteristics and is considered to be one chemical for the purpose of TRI reporting. EPCRA section 313 requires threshold determinations for chemical categories to be based on the total amount of all chemicals in the category. For example, a facility that manufactures three members of a chemical category would count the total amount of all three chemicals manufactured towards the manufacturing threshold for that category. When filing reports for chemical categories, the releases are determined in the same manner as the thresholds. One report is filed for the category and all releases are reported on this form.[3]

About half of the categories are for metal compounds. These compounds generally contain unique chemical substances that contain the parent metal as part of that chemical's infrastructure. The lead compounds category contains any chemical substance containing lead. Some categories are limited to a class of chemicals. For instance, the cyanide compounds category includes any unique chemical described by X^+CN^- where $X=H^+$ or any other group where a formal dissociation may occur (for example KCN or $Ca(CN)_2$). Other categories (for instance polycyclic aromatic compounds) are delimited—only certain listed chemicals are included under the category designation.

Most chemical categories are made up of chemicals that are structurally similar or contain similar functional groups and that cause similar toxic effects. For example, the polycyclic aromatic compounds category contains chemicals that are structurally similar and have the same toxicity concern (cancer). However, the chemicals in the metal compounds categories have widely varying structures but they all contain the same metal component which has the same toxicity concern.

Trade Secrets

A facility may claim the specific identity of a chemical as a trade secret, but the rest of the report (whether Form R or certification statement) must be completed. To make a trade secrecy claim, the facility must submit two versions of the report (one that identifies the chemical and the other with generic chemical identity instead of the real chemical name) and a trade secret substantiation form. Examples of generic chemical identities might include ketone (for methyl ethyl ketone), mineral acid (for nitric acid) or CFC (for dichlorodifluoromethane). Since there are multiple chemicals on the section 313 list that could be described by one of these generic identities, the specific identity of the chemical would not be disclosed.

[3] For metals and metal compounds, if a facility exceeds reporting thresholds for both the "parent" metal (e.g., lead) and metal compounds, the facility may file one combined report (e.g., one report for lead compounds including lead) because the release information reported in connection with metal compounds will be the total pounds of parent metal released.

1.3 PUBLIC ACCESS TO AND USES OF THE TRI DATA

Section 313(h) states that data obtained pursuant to section 313 are intended to provide information to the public as well as to Federal, State, and local governments. The TRI program serves the important function of making data available to inform the public about releases to the environment of the listed chemicals; to assist government agencies, researchers, and other persons conducting research and gathering data; to aid in the development of appropriate regulations, guidelines, and standards; and for other similar purposes. Data submitted to EPA in compliance with section 313 are maintained in the national Toxics Release Inventory (TRI) data base, and are accessible to any person on a cost-reimbursable basis.

EPA makes the TRI data available through a variety of formats including hard copy of Form R reports, annual reports summarizing TRI data nationally and state-by-state, CD-ROM, and through the Internet. With its broad dissemination, TRI data has enjoyed extensive use by the public. Facilities have used the data obtained through TRI to better understand their operations, and make better use of pollution prevention opportunities. Public-interest groups have used the data to educate themselves on the presence of toxic chemicals in the environment, and have used that increased information to engage in meaningful, productive dialogue with industry and with all levels of government. In general, TRI data has proven to be a powerful tool in environmental decision making.

1.4 STATEMENT OF NEED

Federal regulations often are used to address significant market failures. Markets will fail to achieve socially efficient outcomes when differences exist between market valuation and social valuation. One type of market failure occurs when one party's actions impose uncompensated costs or benefits on another party outside a market transaction. For example, a manufacturing facility releasing toxic chemicals to the environment may impose environmental and health risks on the residents of the adjacent community without compensating for those risks. Although created by the manufacturing facility, it is the community rather than the facility that bears the cost of these risks. The EPCRA section 313 reporting requirements were designed to address this market failure, at least in part, by providing information to the public and federal, state, and local governments regarding the release of over 600 chemicals and chemical categories to the environment.

The public is expected to use this information in three important ways. First, the public will use the information to make better informed decisions on where to work and live. Second, as consumers they will use this information to differentiate between the products they purchase thus bringing economic pressure to bear on polluting companies. Third, they will use information on chemical releases to encourage polluting companies to reduce their releases of toxic chemicals. Governments will use the information to identify hot spots, set priorities, evaluate ecological and human health risks, and design better, more informed regulations. In addition, elements of society apart from government and the public may use the information to make decisions. For example,

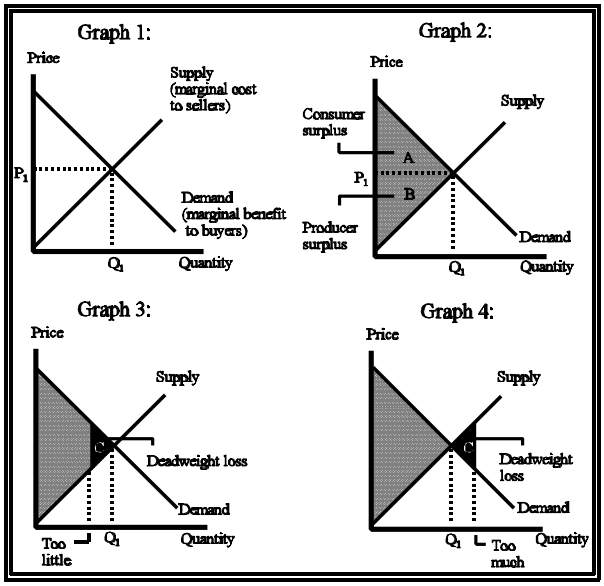
the information enhances the ability of corporate lenders and purchasers to more accurately gauge a facility's potential environmental liabilities.

The following discussion first provides a review of the theory of market failure and how it can be corrected, and then describes the role that TRI can play in correcting a specific market failure.

1.4.1 THE THEORY OF MARKET FAILURE

The theory of modern welfare economics states that allocative efficiency is achieved when it is impossible to change the allocation of resources in such a way as to make someone better off without making someone else worse off. More precisely, economic theory states that allocative efficiency occurs where consumers' marginal benefit exactly equals producers' marginal cost (Samuelson and Nordhaus, 1985). Graph 1 (Figure 1-1) illustrates the efficient allocation of resources. Where the two curves cross, the price is such that demand equals supply and the marginal benefit from consuming that amount exactly matches the marginal cost of producing it. If output were higher, the cost of producing any additional units will exceed their marginal value. Conversely, any decrease in the number of units produced will result in a situation where the benefit of consuming more will exceed the costs of production.

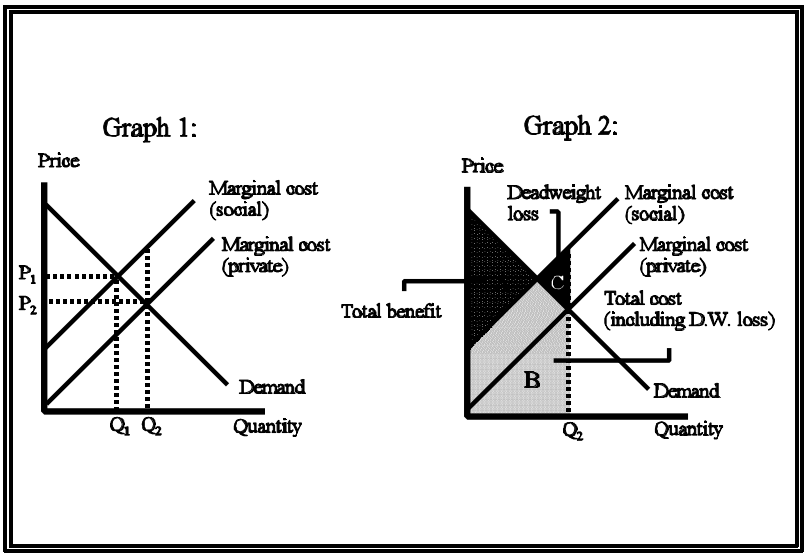
FIGURE 1-1: MARKET EFFICIENCY



In Graph 2 (Figure 1-1), the upper shaded area indicates the difference between the price consumers actually pay for a good and the price consumers would have been willing to pay rather than do without. This difference is known as consumer surplus (area A). The lower region reflects the producer surplus (area B): revenues received less the costs of production. The total welfare gain (consumer and producer surplus) due to the production and consumption of this good is maximized at the efficient quantity Q_1. If the economy fails to achieve this efficient output, society suffers a loss in potential welfare, what economists call a deadweight loss. Graphs 3 and 4 (Figure 1-1) illustrate the deadweight loss (area C) incurred from producing too little or too much of a good, respectively.

The allocation of resources generated by the interaction of supply and demand, however, will not always be desirable from the standpoint of society. The market will fail to achieve a socially efficient outcome when differences exist between market valuation and social valuation. The economic literature identifies four causes of market failure: externalities, public goods, market power (i.e., monopoly, monopsony, and oligopoly), and information asymmetries. The following discussion focuses on externalities and information asymmetries.

FIGURE 1-2: SOURCES OF MARKET FAILURE



In the case of externalities, one party's actions impose uncompensated benefits or costs on another party. For example, in the performance of manufacturing and other business activities, entities may release pollution or cause other environmental harm without accounting for the consequences of these actions on other parties such as members of the local community. These costs are not recognized by the responsible entity in the conventional market-based accounting framework. For example, a company that produces and/or uses hazardous chemicals will pay for labor and capital but will not pay for environmental damages resulting from their emissions of these hazardous chemicals. Because these costs are not recognized by the responsible entity, they are not considered in the consequent production and pricing decisions of the firm. Economists refer to such costs as external costs or externalities.[4] To the extent that these externalities are negative (i.e., impose costs on society), an overproduction and overuse of environmentally hazardous chemicals will occur and an inefficient level of environmental quality will result (Mills and Graves, 1986). One approach to addressing such an externality would be to reduce production of environmentally hazardous chemicals at the firm. A second approach would involve the adoption of pollution prevention practices which might or might not also reduce production at the firm, depending on whether or not the pollution prevention practices result in efficiency gains and the firm's ability to pass on the cost of pollution prevention to consumers.

Graph 1 (Figure 1-2) illustrates the over-production of goods due to the existence of external costs. The private marginal cost curve differs from the social marginal cost curve (private costs + external costs). The distance between the social marginal cost curve and the private marginal cost curve represents the cost to society imposed by the externality. The outcome is a pricing structure such that Q_2 units are produced at price P_2. If the external costs were fully internalized and producers were in fact operating on the social marginal cost curve, the

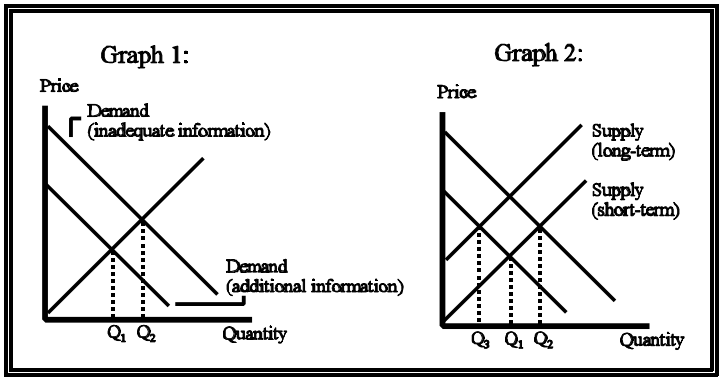
[4] The origin of modern externality theory can be traced back to John Stuart Mill's *Principles of Political Economy*, Alfred Marshall's *Principles of Economics*, and A.C. Pigou's *Wealth and Welfare*.

socially efficient quantity Q_1 would result and consumers would pay a higher price at P_1.[5] The social loss associated with the production of Q_2 is shown by the dark shaded area (area C) in graph 2 (Figure 1-2) which corresponds to the amount of over production that results from producers operating on the private marginal cost curve instead of the social marginal cost curve. The deadweight loss is the difference between total costs (area B and C) and total benefits (area A). This is the same deadweight loss that was illustrated in Graph 4 (Figure 1-1).

The market may also fail to efficiently allocate resources in cases where consumers systematically lack perfect information. In economic theory, perfect information among buyers and sellers is required for individuals to make rational decisions and for resources to be efficiently allocated. There are at least three ways in which information is not, in fact, perfect, which potentially diminishes the efficiency of individuals' decisions: 1) there may be variation in the amount of information held by different market participants (producers and consumers), affecting their potential to realize gains from trading; 2) there may be uncontrollable uncertainty that affects all outcomes, such as how much rainfall will be available to grow a particular crop; and 3) consumers may not have sufficient information regarding the consequences of their decision to make rational decisions, and may or may not be aware of the limitations of the information they do have. This discussion is limited to the third type of imperfect information. Lacking full information of the consequences of their purchases, consumers may over-value or under-value the goods in question. When consumers lack information regarding the negative consequences of their purchases, the result will be a misallocation of resources due to excess demand. For example, increased awareness of the health hazards associated with smoking has resulted in a permanent decrease in the demand for cigarettes (Parkin, 1990). While producers have a strong incentive to inform consumers of the positive aspects of their products in order to increase demand, they do not ordinarily have an incentive to furnish consumers with information regarding the negative consequences associated with their products' use or production, such as the release of toxic chemicals to the environment.

Graph 1 (Figure 1-3) illustrates a shift in demand and reduction in the production quantity due to the provision of information. When furnished with full information, consumer demand shifts inward, resulting in a short-term pricing structure such that the quantity Q_1 is produced. Following a permanent decrease in demand, the market price will fall and some firms will leave the industry. As producers leave the

FIGURE 1-3: INFORMATION PROVISION AND EFFICIENCY



[5] It should be noted, however, that producers may be able to reduce the externality without decreasing production all the way to Q_1. If a producer adopts pollution prevention practices that result in efficiency gains, the externality can be reduced without reducing the quantity produced. In this case, the social marginal cost curve would shift closer to the private marginal cost curve.

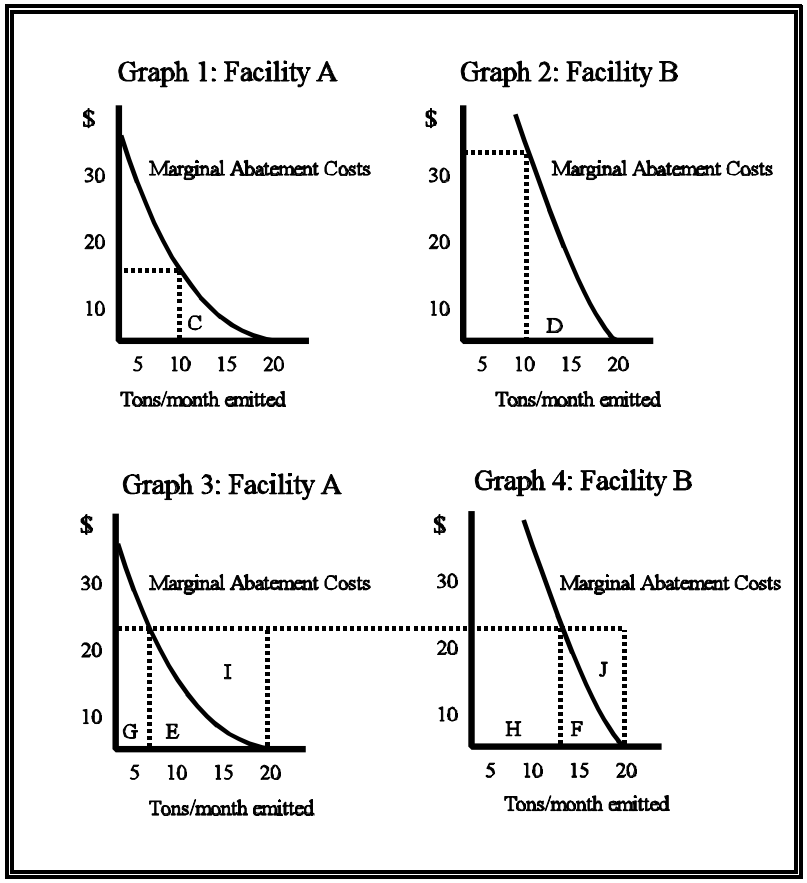
industry, the supply curve shifts to the left and the equilibrium price will gradually rise back to its original level as the market returns to a state of long-term equilibrium (Parkin, 1990). Graph 2 (Figure 1-3) illustrates this shift in supply resulting in a further reduction in the efficient quantity to Q_3. This long-term equilibrium will result as consumers respond to full information by changing their purchasing decisions (increasing or decreasing their consumption), by changing the way they use a product, or by altering their choice of where to live and work.

In the event of a significant market failure, public intervention is often required to override the market directly or to configure market incentives in order to achieve a more socially efficient outcome.[6] Several alternative approaches are available to address market failure and to move society closer to an efficient allocation of resources: command-and-control (C&C) strategies, incentive-based strategies, and information-based strategies. C&C strategies tend to be less sensitive to differences in costs and benefits across polluters by setting standards for the quantities of pollutants a source may release. This approach is typically implemented by mandating specific control technologies (design standards) or specific environmental targets (performance standards). C&C strategies have been widely criticized within the economic literature on several grounds. By imposing a uniform standard across all facilities without consideration of the relative costs of emissions control, the standards approach forgoes possible savings that could be achieved by reallocating emissions reductions among firms in such a way as to achieve the same overall reductions but at a lower cost.

[6] Economists have argued that it is theoretically possible for the firm to negotiate with members of the community about payments to compensate them for the damages they suffer, yielding an efficient distribution of resources even in the presence of externalities (Davis and Hulett, 1977). In his article *The Problem of Social Cost*, R. H. Coase suggests that public intervention is not necessary to correct market imperfections because the affected party may be able to pay the producer of the externality to reduce their activities which result in external costs or to implement pollution controls. Theoretically, the affected party would be willing to offer a "bribe" for incremental pollution reductions up to the point where marginal abatement costs and marginal damages are equal. Both parties would be better off up to this point because the incremental payments made by the affected party will not exceed their marginal damages (the affected party benefits) and the payments received by the firm will exceed their marginal costs of pollution abatement (the polluter benefits). A *socially* efficient level of production is achieved (the equity implications of this solution are not factored into this outcome). For the proper operation of the Coase Theorem, several conditions (which are often unmet in cases of environmental pollution) must be present: 1) property rights must be well defined, enforceable, and transferable; and 2) transaction costs must be minimal in order to allow negotiation to occur (Field, 1994).

Figure 1-4 illustrates the inefficiency of a standard as it applies to two facilities (A and B). Graphs 1 and 2 illustrate the marginal abatement costs—the added costs of achieving a one-unit decrease in emission level—faced by facilities A and B.[7] In both cases, marginal abatement costs increase as greater emission reductions are achieved. Also, marginal abatement costs for any level of emissions are lower for facility A. This situation may result because facility B is older and more expensive to retrofit with pollution control devices. Because marginal abatement costs vary between facility A and B, the standards approach, whether design standards or performance standards, will fail to minimize total abatement costs. Assuming that a maximum emission limit of 10 tons/month is set for each facility, facility A will incur compliance costs equal to area C (Graph 1) and facility B will incur compliance costs equal to area D (Graph 2). However, emission reductions can be reallocated between facilities A and B in such a way as to achieve aggregate abatement costs lower than area C + D. Graphs 3 and 4 illustrate the most efficient (i.e., least cost) allocation that still reduces emissions to 20 tons/month. By reducing emissions to roughly 6 tons/month at facility A and roughly 14 tons/month at facility B, aggregate abatement costs (E + F) are minimized. In all cases, aggregate abatement costs across firms are minimized where marginal abatement costs are equal (in graphs 3 and 4, roughly $21).[8]

FIGURE 1-4: THE INEFFICIENCIES OF STANDARDS



[7] Graphs in Figure 1-4 should be read from right to left, with marginal abatement costs increasing as greater emission reductions are achieved. The area below the marginal abatement cost curve indicates the total costs of abatement. Left unregulated facility A and B will each release 20 tons/month of emissions.

[8] The equimarginal principle states that aggregate costs across facilities are minimized where marginal costs are equal. The principle is not only relevant to pollution abatement costs, but also applies to any situation in which marginal costs vary. For example, a shoe manufacturer that operates multiple facilities may ask how to allocate production of 10,000 shoes across 12 different facilities while minimizing aggregate production costs. The answer is to allocate their production such that marginal costs are equal across all facilities (Field, 1994).

Total reductions are equal to those achieved under the uniform standard (i.e., 20 tons/month), however, total abatement costs are minimized. We will see below that the incentive approach creates a mechanism by which emission reductions occur at least cost by equalizing marginal abatement costs across firms.

Thus far, the discussion has focused on the inefficiency of a uniform standard in achieving a specific emission level. This is a question of cost-effectiveness—does our regulatory approach achieve a given emission level at least cost? In order to insure an efficient allocation of resources, however, emissions must not only be reduced at least cost but must also be reduced to a socially efficient level. Recall that the efficient allocation of resources occurs where marginal benefits equal marginal social costs (Figures 1-1 and 1-2). If a standard is set such that emissions are too high or too low, a deadweight loss will result. In Figure 1-4, emissions were reduced to 20 tons/month. In order to determine if 20 tons/month is the efficient level of emissions, the regulating agency requires data to estimate the shapes of the aggregate marginal cost curve as well as the aggregate marginal benefit curve. Information such as total releases, marginal abatement costs, and human and environmental damages are required to estimate an efficient level of emissions. Assuming that 20 tons/month is the socially efficient level, Figure 1-4 illustrates that a uniform standard may achieve efficiency, but will not do so at least cost.

In addition to their efficiency short-comings, command-and-control strategies will sometimes discourage technological innovation or create a weaker incentive for innovation than the incentive-based approaches discussed below. In the case of a technology based standard, firms will tend to adopt the technology represented by the standard regardless of whether a better (i.e., less expensive) alternative exists. Better to insure compliance than attempt to justify the merits of an alternative approach. In the case of a technology based standard, no incentive exists for research and development (R&D). When faced with a performance standard, the incentive for engaging in R&D equals any avoided compliance costs; however, as we will see below, this is a weaker incentive than is created by the incentive approach (Field, 1994). Both the incentive approach as well as the information based strategies have advantages compared to the standards approach.

Incentive strategies, rather than mandating a uniform standard across all generators, place a price on every unit of pollution creating an incentive for emitters to reduce their emissions. The most common approach is to set a charge per unit of pollution; however, other alternatives are also suggested in the literature, including tradeable discharge permits and abatement subsidies (Field, 1994). The following discussion focuses entirely on emissions charges, however, the general theory is applicable to all incentive strategies.

Several studies have been conducted supporting the efficiency advantages of incentive strategies while simultaneously revealing the unnecessary costs imposed by the command and control approach. The most widely known sources include: *Pollution, Prices, and Public Policy* by Allen Kneese and Charles Schultze, *The Public Use of Private Interest* by Charles Schultze, and *Economics of the Environment*, a collection of essays edited by Robert and Nancy S. Dorfman. Incentive type approaches are able to reduce the same quantity of emissions at a lower cost compared to command-and-control strategies because an incentive is created for reductions to occur where it is least costly to do so. For example, a charge per ton of SO_2 will create an

incentive for firms to reduce their emissions until their marginal cost of reducing one additional ton exceeds the per ton emissions charge. Firms that can economically reduce their SO_2 emissions will do so, while others may choose to incur the cost of the fee. Higher emission charges will induce greater emissions reductions and a reduction in the emissions charge will increase emissions.

Returning to Graphs 3 and 4 (Figure 1-4), it can be seen that an emissions charge will automatically lead to the most efficient allocation of emissions reductions (i.e., where marginal abatement costs are equal). By establishing a fee of $21/ton /month, an incentive is created for facility A to reduce emissions to roughly 6 tons/month. By reducing emissions to 6 tons/month, facility A incurs total fee payments equal area G and total abatement costs equal to area E. If facility A were to continue emitting 20 tons/month and incur the entire cost of the fee, total fee payments would equal area G + E + I. Assuming that facility A and B are operating in a competitive market with perfect information, they will reduce their emissions up to the point where marginal abatement costs are equal to the per ton fee, effectively minimizing their total costs (i.e., emissions fee plus abatement costs). Facility B, operating under the same competitive pressures, will reduce emissions to roughly 14 tons/month, incurring costs equal to area H (fee payment) and F (abatement cost). Because of the incentive created by an emissions fee, emission reductions will automatically be allocated such that abatement costs are minimized. In addition, the incentive to engage in research and development efforts is stronger under an emissions fee compared to a standard. Recall that the incentive for R&D under an emissions standard is equal to avoided compliance costs. In contrast, the incentive to engage in R&D under an emissions fee is equal to avoided compliance costs plus any avoided fee payments.

While an emissions charge will insure that reductions occur at least cost, it will not insure a socially efficient allocation of resources. In order to achieve an efficient allocation of resources, an emissions fee must be set such that marginal benefits equal marginal social costs. If an emissions fee is set too high or too low, a deadweight loss will result. As with the standards approach, the regulating agency requires data in order to estimate the shapes of the aggregate marginal cost curve and the aggregate marginal benefit curve. An alternative option would be to establish an emissions fee, then observe ambient pollution levels and determine if a socially efficient outcome results. If ambient pollution levels decrease by too much or too little, the fee would then be lowered or raised as appropriate. Such an approach, however, is likely to be enormously disruptive to industry. Industry is likely to respond to an emissions charge by investing in costly pollution-control technology. Any changes in the emissions fee are likely to disrupt capital investment plans, placing a further premium on accurate data to estimate an appropriate emissions charge from the beginning. Although an emissions fee may not always achieve an efficient level of pollution, it will allocate reductions at least cost.[9]

The third approach to addressing the existence of externalities is information-based strategies. As in the case of incentive strategies, information-based strategies provide a more

[9] In contrast, an emissions standard will not always achieve an efficient level of pollution and is unlikely to allocate reductions at least cost. In order for an emissions standard to minimize abatement costs, all facilities must operate under the same marginal abatement cost structure.

market oriented alternative to command-and-control approaches. Specifically, they can lead to more cost-effective reductions in chemical emissions by allowing facilities the flexibility to decide whether and how to make reductions. The various approaches are quite varied: government testing and rating systems, mandatory disclosure requirements such as labeling and periodic reporting, and government provision of information. As illustrated above, the provision of information works to internalize costs by informing consumers of the external economies and diseconomies associated with their purchasing decisions.[10] Consumers may respond to the additional information by changing their purchasing decisions (increasing or decreasing their consumption), by changing the way they use a product, or by altering their choice of where to live and work.[11] In cases where the market is unlikely to provide adequate information, public intervention is sometimes required to provide consumers with information that will allow them to make these decisions efficiently.

1.4.2 THE EFFECT OF TRI INFORMATION ON MARKET FAILURE

Through the provision of toxic chemical release data, the Toxics Release Inventory (TRI) overcomes firms' disincentive to provide information on their toxic releases and moves society toward an efficient allocation of resources in three important ways:

1) *By allowing more informed decisions to be made by society, consumers, and corporate lenders, purchasers and stockholders*. According to OMB guidance, "If intervention is necessary to address a market failure arising from inadequate information, informational remedies will generally be the preferred approaches. As an alternative to a mandatory standard, a regulatory measure to improve the availability of information has the advantage of being a more market-oriented approach. Thus, providing consumers information about concealed characteristics of consumer products gives consumers a greater choice than banning these products" (OMB, 1996). In the case of toxic chemical releases, however, it is not just consumers that are affected.[12] Rather, society at large is affected by the release of toxic chemicals into their communities. It is individuals in society that bear the burden of the externality and individuals in society that require information on toxic chemical releases in order to make rational decisions regarding such things as where to live and work.

By informing society of the toxic chemical releases in their communities, an incentive is created for industry to reduce emissions. Release data holds the potential to adversely affect a company's public image and companies may respond to that possibility whether their concern be

---

[10] Provision of information may be at least one step removed as in the case where the hazard associated with a product may be attributable to an input, not the final product.

[11] Information provision may also influence how consumers allocate their time, in addition to how they allocate their purchasing decisions. For example, information regarding the health benefits of regular exercise may encourage consumers to allocate more of their time to exercise.

[12] TRI data does not provide total chemical releases for a consumer ready product, therefore, demand changes attributable to TRI are assumed to be limited. In addition, the external costs of toxic chemical releases are not always borne by the consumer of the product, further diminishing the likely impact on consumer demand.

real or perceived. Santos, Covello, and McCallum surveyed 221 facilities subject to TRI reporting and found that nearly all facilities had reported reduced emissions and half had increased their environmental communication activities despite the fact that public inquiries did not increase. The authors interpret their results as an indication that the mere potential for adverse public reaction may provide an important motivator for emissions reductions (Santos et al., 1996). Information provision will not correct the entire market failure. However, to the extent that companies "perceive" that their public image will be adversely affected by the public dissemination of toxics release data, they will respond by reducing emissions. Concerns are most likely to exist when facility releases per unit of production (which can be calculated using TRI data in conjunction with production data) are higher than average within their industry or releases are increasing over time. Such determinations could not be made without the inter-temporal and inter-facility data provided by TRI.

In addition to informing affected communities and consumers, the information provided by TRI enhances the ability of corporate lenders, purchasers, and stockholders to more accurately gauge a facility's potential environmental liabilities, again resulting in better-informed decision making. Investors who are unaware of a firm's emissions may overvalue their stock because they have inadequate information regarding the company's potential liability, abatement expenditures, and fines. Better information will help stockholders to more accurately value the stock (Hamilton, 1995).

2) *By providing vital information for the efficient design and targeting of federal, state, and local enforcement and regulatory programs*. Toxic chemical release data is used by governments to identify hot spots, set priorities, and monitor trends, all of which can yield more informed decisions. For example, EPA's Office of Air and Radiation (OAR) has used TRI data for a variety of tasks related to the implementation of the Clean Air Act Amendments of 1990 (CAAA): 1) TRI data have been used in setting research priorities for the 189 Hazardous Air Pollutants (HAPs) identified in the CAAA; 2) TRI data are used by OAR to target potential sources for inclusion in the Early Reductions Program (a means of achieving enforceable reductions of toxic emissions before a regulation is in place); and 3) TRI facility-level locational data are being used in conjunction with other demographic data to improve exposure assessment. The TRI is unique in that it allows comparisons between firms within the same industry as well as across industries, again yielding better-informed decisions in the design of regulations as well as in the development of voluntary programs. Moreover, because of the way the information is disseminated, such decisions do not have to be made by the federal government, but can also occur at the state or local level. TRI data will not fully internalize the external costs associated with the release of toxic chemicals; however, to the extent that TRI contributes to the efficient design of new regulations and voluntary programs, external costs are likely to be addressed in an efficient manner.

3) *By informing facilities of opportunities to reduce emissions*. TRI information provides facilities themselves with important information for judging their own performance and may alert them to opportunities for the implementation of pollution prevention or recycling projects. In some cases, firms may change their behavior by increasing recycling or treatment efforts without affecting the marginal costs of production. Behavioral changes will be in the firms' own self-

interest by minimizing the cost of production. In such cases, emissions may be reduced without any affect on consumption.

While the TRI does provide information on chemical releases, it does not provide any information on the costs associated with the externalities created by such releases. However, the dissemination of information through TRI mitigates two causes of market failure: incomplete information and externalities. By addressing these market failures, TRI moves society closer to an efficient allocation of resources and increases social welfare. Addressing market failure through information provision avoids inefficiencies inherent in command and control regulations. Also, to the extent that TRI informs regulating agencies of the marginal costs and benefits associated with the release of toxic chemicals, inefficiencies associated with incentive strategies may be avoided.

1.5 STATUTORY AUTHORITY

EPCRA section 313 contains default reporting thresholds, which are set forth in section 313(f)(1). Section 313(f)(2) allows EPA to "establish a threshold amount for a toxic chemical different from the amount established by paragraph (1)." The amounts established by EPA may, at the Administrator's discretion, be based on classes of chemicals or categories of facilities. There are no requirements that trigger EPA's authority to revise the reporting thresholds, nor is the Agency required to exercise that authority under any particular circumstances. Instead, section 313(f)(2) is a broad authority that EPA may use as appropriate, in EPA's judgment, to set thresholds for particular chemicals, classes of chemicals, or categories of facilities. EPCRA section 328 provides the authority for EPA to make modifications to other section 313 reporting requirements. Specifically, section 313 provides that the "Administrator may prescribe such regulations as may be necessary to carry out this chapter."

1.6 PURPOSE AND SCOPE OF THIS REPORT

This report examines the increase in reporting that will result from modifying the TRI program to obtain additional reports on lead and lead compounds. The specific proposed modifications to the TRI program are described in detail in Chapter 2.

1.7 ORGANIZATION OF THIS REPORT

This report examines the potential increase in reporting that would result from lowering TRI reporting thresholds for lead and lead compounds. This report also estimates the costs to industry and EPA associated with the reporting burden and other impacts of the rule. The remainder of this report is organized as follows:

- **Chapter 2** describes the regulatory options and modifications to reporting requirements considered by EPA.
- **Chapter 3** summarizes the expected number of reports and facilities affected by the proposed rule.
- **Chapter 4** presents the methodology used to estimate the costs and the results of the analysis in terms of total cost to industry and total cost to EPA.
- **Chapter 5** examines the impacts of the proposed rule, including those impacts on "small" entities as required by the Regulatory Flexibility Act of 1980.
- **Chapter 6** evaluates the benefits of additional reporting on lead and lead compounds.
- **Appendices**. Appendix A describes in detail the analysis performed to develop estimates of the number of reports and affected facilities. Appendix B, C, and D describe the costs and small entity impacts of the proposed lead rule and the proposed PBT rule.

LITERATURE CITED

Agee, Mark D. and Thomas D. Crocker. "Parental and Social Valuations of Child Health Information" (1994). Journal of Public Economics 55, 89-105, 1994.

Baumol, William J.. The Theory of Environmental Policy: Externalities, Public Outlays, and the Quality of Life (1975). Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1975

Bergeson, Lynn L. And Lisa M. Campbell. "Economic Incentives for TQEM: Are They in Your Future?" (1991-2) Total Quality Environmental Management, Volume 1, Number 2, Winter 1991-2.

Burrows, Paul. The Economic Theory of Pollution Control. Cambridge, Mass.: The MIT Press. 1980

Coase, R. H. "The Problem of Social Cost." (1960) *Journal of Law and Economics* 1 (October): 1-44, 1960.

Cowen, Tyler. The Theory of Market Failure: A Critical Examination (1988). Fairfax, Va,: George Mason University Press, 1988.

Davis, J. Ronnie and Joe R. Hulett. An Analysis of Market Failure: Externalities, Public Goods, and Mixed Goods. Gainesville: University Press of Florida. 1977.

Dorfman, Robert and Nancy Dorfman. Economics of the Environment: Selected Readings. New York: Norton. 1972.

Field, Barry. Environmental Economics: An Introduction. McGraw-Hill, Inc. 1994

Hamilton, James T. "Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data." (1995) Journal of Environmental Economics and Management 28, 98-113, 1995.

Hochman, H. M. And J. D. Rogers. "Pareto Optimal Redistribution." (1969) American Economic Review, September, 1969.

Kelman, Steve. What Price Incentives?: Economists and the Environment (1981). Boston, Mass.: Auburn House, 1981.

Kneese, Allen V. and Charles L. Schultze. Pollution, Prices, and Public Policy (1975). Washington, DC: The Brookings Institute, 1975.

Lis, James and Kenneth Chilton. "Limits of Pollution Prevention." (1993) Society, volume 30, number 3, page 49 (7), March-April, 1993.

Marshall, Alfred. Principles of Economics, 8th ed. London: Macmillan, 1920.

Mill, John Stuart. Principles of Political Economy, ed. W. J. Ashley (1965). New York: Augustus M. Kelly, 1965.

Mills, Edwin S. and Philip E. Graves. The Economics of Environmental Quality (1986). New York: W.W. Norton, 1986.

OMB, Office of Management and Budget. Economic Analysis of Federal Regulations Under Executive Order 12866 (1995). Executive Office of the President, Office of Management and Budget, January 1995, p.8.

Parkin, Michael. Economics (1990). Addison-Wesley Publishing Company, Inc., 1990.

Pigou, A. C. Wealth and Welfare (1912). London: Macmillan, 1912.

Samuelson, Paul A. And William D. Nordhaus. Economics (1985). McGraw Hill, Inc., 1985.

Santos, Susan L., Vincent T. Covello, and David B. McCallum. "Industry Response to SARA Title III: Pollution Prevention, Risk Reduction, and Risk Communication." (1996) Risk Analysis, volume 16, number 1, 1996.

Schultze, Charles L. The Public Use of Private Interest (1977). Washington, DC: The Brookings Institute, 1977.

CHAPTER 2
DESCRIPTION OF REGULATORY OPTIONS

This chapter describes the regulatory options considered for this proposed rule. In Section 2.1, background information is presented on the development of the regulation. Section 2.2 discusses the proposed changes to the reporting thresholds. Other proposed changes to the section 313 reporting requirements for lead and lead compounds are identified in Section 2.3.

2.1 BACKGROUND

Section 313(f)(1) of EPCRA sets reporting thresholds at 25,000 pounds for chemicals that are manufactured or processed and 10,000 pounds for chemicals that are otherwise used. Because of the persistent and bioaccumulative characteristics of lead and lead compounds, existing EPCRA 313 reporting thresholds may preclude the capture of important information because facilities manufacture, process, or otherwise use these chemicals at levels below the current reporting thresholds. Under the proposed rule, EPA will revise reporting thresholds for lead and lead compounds. The lower reporting thresholds that EPA has considered are described in section 2.2.

In addition to revising the thresholds for these chemicals, the Agency is also proposing other concurrent changes for reporting of lead and lead compounds, such as eliminating the *de minimis* exemption. These changes are described in section 2.3.

2.2 REVISED REPORTING THRESHOLDS

Under the current section 313 reporting requirements, information on lead and lead compounds at certain facilities is not captured by TRI due to the levels at which reporting thresholds are set. Under Section 313(f)(1) of EPCRA, reporting thresholds are currently set at 25,000 pounds for chemicals that are manufactured or processed, and 10,000 pounds for chemicals that are otherwise used. Facilities with less than these threshold amounts do not currently report to TRI.

The regulatory options that EPA evaluated were created by varying the reporting thresholds from their current levels of 25,000 pounds for manufacture and processing, and 10,000 pounds for otherwise use of EPCRA Section 313 chemicals. EPA considered the following options for reporting of lead and lead compounds to TRI:

- **Option 1.** Reporting threshold of 1 pound of lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 2.** Reporting threshold of 10 pounds lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 3.** Reporting threshold of 100 pounds lead and/or lead compounds manufactured, processed or otherwise used.

- **Option 4.** Reporting threshold of 1,000 pounds lead and/or lead compounds manufactured, processed or otherwise used.

2.3 OTHER PROPOSED CHANGES

EPA is also proposing a number of additional changes in TRI reporting to obtain additional reporting on lead and lead compounds.

2.3.1 ELIMINATION OF *DE MINIMIS* EXEMPTION

EPA is proposing to eliminate the *de minimis* exemption for lead and lead compounds. Reporters under EPCRA section 313 are currently allowed a limited *de minimis* exemption for certain low concentrations of chemicals in mixtures or other tradename products they process or otherwise use. The *de minimis* exemption also applies to the manufacture of a toxic chemical as an impurity if it remains below *de minimis* concentrations in the product distributed in commerce, or if it is imported in below *de minimis* concentrations. In these situations, facilities may disregard *de minimis* concentrations of toxic chemicals in making threshold determinations for section 313 reporting. Manufacture of a toxic chemical as a byproduct is not covered by the *de minimis* exemption. Currently, it is possible to meet an activity threshold for a toxic chemical on a facility-wide basis, but not be required submit a report under section 313 because the facility only deals with mixtures or tradename products containing the toxic chemical at levels below *de minimis* concentrations.

The *de minimis* exemption was not intended as a small quantity exemption, but as an exemption based on the limited information likely to be readily available to facilities affected by EPCRA section 313. Allowing facilities to continue to take the *de minimis* exemption for lead and lead compounds may deprive communities of important information on these chemicals. Some facilities may exceed the lower reporting threshold based on processes that involve lead and lead compounds in a mixture where the lead or lead compound is below the applicable *de minimis* level. All releases and other waste management activities associated with these activities would then be exempt from reporting. While these chemicals may exist in mixtures at below the *de minimis* levels, they still concentrate in the environment and in organisms.

It should be noted that EPCRA does not require additional monitoring or sampling in order to comply with the reporting requirements under EPCRA section 313. Information used should be based on production records, monitoring, or analytical data, guidance documents provided by EPA and trade associations and reasonable judgement on the part of the facility's

management. Even with the proposed elimination of the *de minimis* exemption for lead and lead compounds, no further monitoring or analysis of production, process, or use would be required.

As noted above, the *de minimis* exemption does not currently apply to the manufacture of toxic chemicals as byproducts. Thus, eliminating it would have no net effect on the additional reporting of chemicals that are manufactured as byproducts. At lower reporting thresholds, the facilities most likely to have activities qualifying for the existing *de minimis* exemption would be those that process lead and lead compounds as trace components of coal or petroleum products. To qualify for the *de minimis* exemption, the concentration of lead or lead compound in the product would have to be below *de minimis* levels (0.1 percent for lead and inorganic lead compounds, and 1 percent for organic lead compounds). In addition, no lead or lead compound could be manufactured as a byproduct as a result of processing activities. This second factor would exclude facilities whose operations result in the manufacture lead or lead compounds as byproducts due to high temperatures or chemical reactions.

Based on information presented in Appendix A, it appears that the facilities with operations most likely to qualify for the *de minimis* exemption would be coal mining facilities (SIC code 12) and petroleum bulk stations and terminals (SIC code 5171). The *de minimis* exemption potentially could also be taken by facilities in other industry groups such as steel works, blast furnaces, and rolling and finishing mills (SIC code 331) or iron and steel foundries (SIC code 332), but additional information would be required to determine if lead or lead compounds are manufactured as a byproduct or as an impurity. If lead or lead compounds are manufactured exclusively as an impurity, these facilities could also take advantage of the *de minimis* exemption if it were to be retained for lead and lead compounds.

The incremental cost of eliminating the *de minimis* exemption as it applies to lead and lead compounds has not been estimated separately from the regulatory options for lower reporting thresholds. However, the expected effects of this action on reporting of lead and lead compounds have been incorporated into the estimates of additional reporting. The estimated industry cost for each regulatory option, as presented in Chapter 3, incorporates the proposed elimination of the *de minimis* exemption for lead and lead compounds.

2.3.2 ALTERNATE THRESHOLD AND FORM A

EPA is proposing to require facilities to file Form R reports for lead and lead compounds. Current regulations allow facilities that have less than 500 pounds of production-related waste of a listed toxic chemical and that do not manufacture, process, or otherwise use more than one million pounds of that listed toxic chemical to file a Form A certification statement. The Form A certifies that the facility does not exceed either of these quantities for the toxic chemical, and includes facility and chemical identification information.

EPA is proposing to exclude all lead and lead compounds from the alternate threshold of one million pounds. While the Form A does provide some general information on the quantities of the chemical as waste that the facility manages, the release, transfer, and waste management information is much more limited than that provided by the Form R.

The costs of this proposed action are reflected in the "Per Report Cost" section of the cost analysis described in Chapter 3. All of the additional reports filed under the regulatory options are assigned the unit cost for filing the Form R.

2.3.3 RANGE REPORTING

EPA is proposing to require facilities filing reports on lead and lead compounds to report numerical values for releases and off-site transfers for waste management. EPA currently allows facilities to report the amount either as a whole number or by using range codes for releases and off-site transfers for further waste management of the toxic chemical of less than 1,000 pounds. The reporting ranges are: 1 to 10 pounds; 11 to 499 pounds; and 500 to 999 pounds. For larger releases and off-site transfers for further waste management of the toxic chemical, the facility may report only the whole number.

The Agency has noted a number of drawbacks to range reporting. Use of ranges could misrepresent data accuracy because the low or the high end range numbers may not be close to the estimated value, even taking into account its inherent error *(i.e.*, errors in measurements and developing estimates). The user of the data must make a determination on whether to use the low end of the range, the mid-point, or the upper end. For example, a release of 501 pounds could be misinterpreted as 999 pounds if reported as a range of 500 to 999. This represents a 100 percent error. This uncertainty severely limits the applicability of release information where many releases, particularly for PBT chemicals, may be within the amounts eligible for range reporting.

The elimination of range reporting for lead and lead compounds is not expected to affect the unit cost of reporting. Range reporting is related to how information is *presented* on the reporting form rather than how it is *calculated*. For example, a facility would calculate its estimate of chemical releases or other waste management based on readily available information. Under current reporting rules, the facility then has the option of presenting the result (if less than 1,000 pounds) as a point estimate or as a range in sections 5 and 6 of the Form R. There is no range reporting option for the presentation of data in section 8. As an issue of presentation, the elimination of range reporting for lead and lead compounds is not expected to have any effect on unit reporting costs.

2.3.4 HALF-POUND RULE AND WHOLE NUMBER REPORTING

EPA is proposing that all releases or other waste management quantities of greater than a tenth of a pound of lead or lead compounds be reported, provided that the appropriate activity threshold has been exceeded. EPA is also proposing that for release and other waste management quantities less than ten pounds, fractional quantities (*e.g.*, 6.2 pounds) rather than whole numbers would be reported, provided that the accuracy of the underlying data on which the estimate is based supports this level of precision. For quantities of ten pounds or greater, whole numbers would continue to be reported. Under the proposed action, releases and other waste management activities would continue to be reported to two significant digits.

EPA currently requires that facilities report numerical quantities in sections 5, 6, and 8 of Form R as whole numbers and does not require more than two significant digits. EPA also currently allows facilities to round releases of 0.5 pounds or less to zero. The combination of requiring the reporting of whole numbers and allowing rounding to zero may result in a significant number of facilities reporting their releases of some lead and lead compounds as zero.

As an issue of presentation rather than estimation, this proposed action for lead and lead compounds is not expected to have any effect on unit reporting costs.

2.3.5 REPORTING LIMITATION FOR METALS IN ALLOYS

EPA is proposing to limit the reporting for TRI metals to exclude certain alloys that contain the metal from reporting thresholds. Lead and lead compounds can be found in various types of alloys used at facilities which are subject to reporting under section 313. EPA is proposing to exclude lead and lead compounds from reporting when contained in a brass, bronze, or stainless steel alloy.

Under this limitation for alloys, reporting facilities that make alloys may still report for lead and lead compounds since it is being used to manufacture an alloy. However, once incorporated into the brass, bronze, or stainless steel alloy, lead and lead compounds are not reportable. Cutting, grinding, shaving, and other activities involving a brass, bronze, or stainless steel alloy do not negate the reporting limitations for alloys containing lead and lead compounds.

The effects of this proposed action have been incorporated into the estimates of additional reports and reporting facilities. No additional reports have been predicted from facilities as a result of cutting, grinding, shaving, and other activities involving a brass, bronze, or stainless steel alloy.

2.3.6 INDIVIDUAL REPORTING OF ALKYL LEAD COMPOUNDS

The alkyl lead compounds tetraethyl lead and tetramethyl lead are currently reportable under the EPCRA section 313 category listing for lead compounds. To improve tracking of these alkyl lead compounds, EPA has proposed (January 5, 1999; 64 FR 688) that separate reports be filed for these two members of the lead compounds category.

Specifically, that proposed rule requested comment on requiring facilities with one or more pounds of tetraethyl or tetramethyl lead applicable toward the reporting threshold determinations for the lead compounds category to file separate reports for the two compounds. In the alternative, EPA requested comment on requiring tetraethyl and tetramethyl lead to be combined in a single report separate from other lead compounds. EPA is currently reviewing comments on the proposal and has not issued a final rule.

CHAPTER 3
ESTIMATES OF THE NUMBER OF ADDITIONAL REPORTS AND AFFECTED FACILITIES

This chapter presents estimates of the number of additional reports on lead and lead compounds resulting from the proposed lead rule, as well as the number of affected facilities in each industry group that may file these reports.[13] Numbers of facilities and reports are presented for each regulatory option. These estimates are used to calculate the costs to the regulated community and to EPA (see Chapter 4), to evaluate the impacts on small entities (see Chapter 5), and to discuss the potential benefits of the proposal (see Chapter 6). Section 3.1 presents the estimated number of reports. Section 3.2 presents the estimated number of affected facilities. Section 3.3 discusses the extent of overlap in facilities affected by the proposed lead rule and the proposed PBT rule.

3.1 ESTIMATED NUMBER OF ADDITIONAL REPORTS

As discussed in Appendix A, the number of reports expected to be filed for lead and lead compounds by each industry group was estimated for four lower reporting thresholds: 1 lb, 10 lbs, 100 lbs, and 1,000 lbs manufactured, processed, or otherwise used. In most cases, a best estimate was derived using the best available data.[14]

The best estimate of the number of additional reports for lead and lead compounds is presented by option and by industry group in Table 3-1. As described in Chapter 2, Option 1 corresponds with the lowest reporting threshold (1 lb), while Option 4 corresponds with the highest reporting threshold (1,000 lbs). As shown in both tables, the number of additional reports decreases as the reporting threshold increases. More extensive explanations of the data sources, methodologies, and calculations used to generate these estimates are provided in Appendix A.

[13] The term "affected facilities" is used in this report to denote facilities that meet the revised TRI reporting requirements and are expected to submit a Form R for lead and lead compounds. Additional facilities in an SIC code may be required to perform compliance determination activities if their industry group is subject to TRI reporting. A Form R is completed for a single chemical. Facilities may submit more than one Form R if they manufacture, process, or otherwise use more than one listed TRI chemical. The number of facilities performing compliance activities and the associated costs are estimated in Chapter 4.

[14] In one case, SIC code 5171, a range was generated because development of a point estimate was not possible. This range presents a best estimate and a maximum number of reports. For the purposes of the cost analysis, the best estimate of the number of reports is used.

3.2 ESTIMATED NUMBER OF AFFECTED FACILITIES

By analyzing industry sectors from which reporting might potentially occur, the number of facilities expected to file a report for lead and lead compounds as a result of the proposal was estimated. Industry sectors potentially affected by the rule include:

- Metal mining (SIC code 10)
- Coal mining (SIC code 12)
- Electric services (SIC code 4911)
- Electric and other services (SIC code 4931)
- Combination utilities (SIC code 4939)
- RCRA subtitle C hazardous waste facilities (SIC code 4953)
- Chemical and allied products-wholesale (SIC code 5169)
- Petroleum bulk stations & terminals (SIC code 5171)
- Solvent recyclers (SIC code 7389)
- Manufacturing (SIC codes 20 -39)

The methodology used to estimate the number of additional lead and/or lead compound reports is presented in Appendix A. Because each facility could file, at most, one report for lead and lead compounds, the number of *facilities* reporting in an industry group is equal to the number of *reports* estimated to be filed by that industry group. The number of facilities expected to report in each industry group as a result of the proposal is presented in Table 3-1.

To estimate the cost of the proposed lead rule it was also necessary to estimate the number of facilities filing a TRI report for the first time as a result of the proposal. Specifically, calculation of "rule familiarization" costs requires an estimate of the number of facilities that will be reporting to TRI for the first time, since only "first time filers" will incur this cost (see Chapter 4). First time filers are projected for only the manufacturing sector (SIC Codes 20-39). It is expected that all of the facilities in the non-manufacturing industry groups submitting additional reports under this proposed rule for lead and lead compounds will file TRI reports on other TRI chemicals in a previous reporting year.[15]

To generate an estimate of first time filers in the manufacturing sector it is assumed that the distribution of reports per facility will not change after the lead rule is promulgated. It is further assumed that if a facility files a single report, and it is for lead and lead compounds, then the facility must be new to the TRI system. Therefore, the number of manufacturing facilities submitting reports for lead and lead compounds is multiplied by the percentage of reporters that filed only one report in 1996 (38.3 percent). Table 3-1 presents the number of facilities, first time filers, and additional reports by industry group and by option.

[15] It appears that facilities in expansion industries that are expected to report on lead or lead compounds are likely to file reports on other TRI chemicals which are present at these facilities in much greater amounts. For further information, see the "Economic Analysis of the Final Rule to add Certain Industry Groups to EPCRA Section 313."

TABLE 3-1
NUMBERS OF FACILITIES AND ADDITIONAL REPORTS
ASSOCIATED WITH LEAD AND LEAD COMPOUNDS
BY INDUSTRY GROUP

	Option 1			Option 2 (Preferred Option)			Option 3			Option 4		
Industry Group	**Total Number of Facilities**	**Number of First Time Filers**	**Number of Reports**	**Total Number of Facilities**	**Number of First Time Filers**	**Number of Reports**	**Total Number of Facilities**	**Number of First Time Filers**	**Number of Reports**	**Total Number of Facilities**	**Number of First Time Filers**	**Number of Reports**
SIC 10	0	0	0	0	0	0	0	0	0	0	0	0
SIC 12	321	0	321	321	0	321	321	0	321	321	0	321
SIC 4911	246	0	246	227	0	227	196	0	196	157	0	157
SIC 4931	150	0	150	135	0	135	111	0	111	83	0	83
SIC 4939	18	0	18	16	0	16	12	0	12	8	0	8
SIC 4953	80	0	80	74	0	74	64	0	64	36	0	36
SIC 5169	0	0	0	0	0	0	0	0	0	0	0	0
SIC 5171	2,459	0	2,459	980	0	980	621	0	621	55	0	55
SIC 7389	26	0	26	24	0	24	22	0	22	14	0	14
SIC 20-39	19,323	7,401	19,323	13,266	5,081	13,266	7,415	2,840	1,415	2,231	854	2,231
TOTAL	22,623	7,401	22,623	15,043	5,081	15,043	8,762	2,840	8,762	2,905	854	2,905

3.3 POTENTIAL OVERLAP IN AFFECTED FACILITIES BETWEEN THE PROPOSED LEAD RULE AND THE PROPOSED PBT RULE

The effects of the proposed lead rule on TRI reporting are analyzed incrementally from current TRI reporting. Current reporting requirements are described in Section 1.1, while current TRI reporting on lead and lead compounds is described in Appendix A. On January 5, 1999 EPA proposed to modify current reporting requirements for certain persistent bioaccumulative toxic (PBT) chemicals (January 5, 1999; 64 FR 688). Because the PBT proposal is not yet final, the reports associated with the proposed PBT rule are not considered to be part of current (or "baseline") reporting.[16] However, facilities affected by the proposed lead rule may include facilities that are also affected by the PBT proposal.

Under the lead proposal, a "first time filer" is an affected facility that 1) does not currently file to TRI for any chemical, and 2) is expected to submit a report for lead and lead compounds as a result of the proposed lead rule. This facility may potentially report on one or more PBT chemicals as a result of the PBT proposal. Since neither the lead proposal nor the PBT proposal have been finalized, first time filers resulting from one proposal are not considered as part of the reporting baseline for the other rule. First time filing status can only be experienced once by a facility. Therefore, the economic analyses of the two proposals may have overcounted the number of first time filers to the extent that the same first time filers would report on lead and one or more PBT chemicals. The potential overlap in first time filers is shown as Area B in Figure 3-1 below. As shown in Figure 3-1:

First time filers affected by the Lead proposal = Areas A + B, or

3,308 (first time filers affected by the lead proposal only)
\+ 1,773 (first time filers affected by both proposals)
= 5,081 facilities at the preferred option

First time filers affected by the PBT proposal = Areas B + C, or

827 (first time filers affected by the PBT proposal only)
\+ 1,773 (first time filers affected by both proposals)
= 2,600 facilities at the preferred option

Unique first time filers affected by the Lead and PBT proposals = Areas A + B + C, or

3,308 (first time filers affected by the lead proposal only)
\+ 827 (first time filers affected by the PBT proposal only)
\+ 1,773 (first time filers affected by both proposals)
= 5,908 facilities at the preferred options

[16] Appendix B contains additional information on the estimation of facility overlap between the Lead and PBT proposals.

Under the lead proposal, a "current filer" is an affected facility that 1) currently files to TRI for one or more chemicals, and 2) is expected to submit a report for lead and lead compounds as a result of the proposed lead rule. This facility may potentially report on one or more PBT chemicals as a result of the PBT proposal. The potential overlap in current filers is shown as Area E in Figure 3-1 below. As shown in Figure 3-1:

Current filers affected by the Lead proposal = Areas D + E, or

5,347 (current filers affected by the lead proposal only)
\+ 4,615 (current filers affected by both proposals)
= 9,962 facilities at the preferred option

Current filers affected by the PBT proposal = Areas E + F, or

2,300 (current filers affected by the PBT proposal only)
\+ 4,615 (current filers affected by both proposals)
= 6,915 facilities at the preferred option

Unique current filers affected by the Lead <u>and</u> PBT proposals = Areas D + E + F, or

5,347 (current filers affected by the lead proposal only)
\+ 2,300 (current filers affected by the PBT proposal only)
\+ 4,615 (current filers affected by both proposals)
= 12,262 facilities at the preferred options

The total number of unique facilities potentially affected by the lead and PBT proposals is the sum of 1) the number of unique first time filers, and 2) the number of unique current filers. These numbers are derived above and also shown in Figure 3-1 below:

Filers affected by the Lead proposal = Areas A + B + D + E , or

5,081 (first time filers)
\+ 9,962 (current filers)
= 15,043 facilities at the preferred option

Filers affected by the PBT proposal = Areas B + C + E + F, or

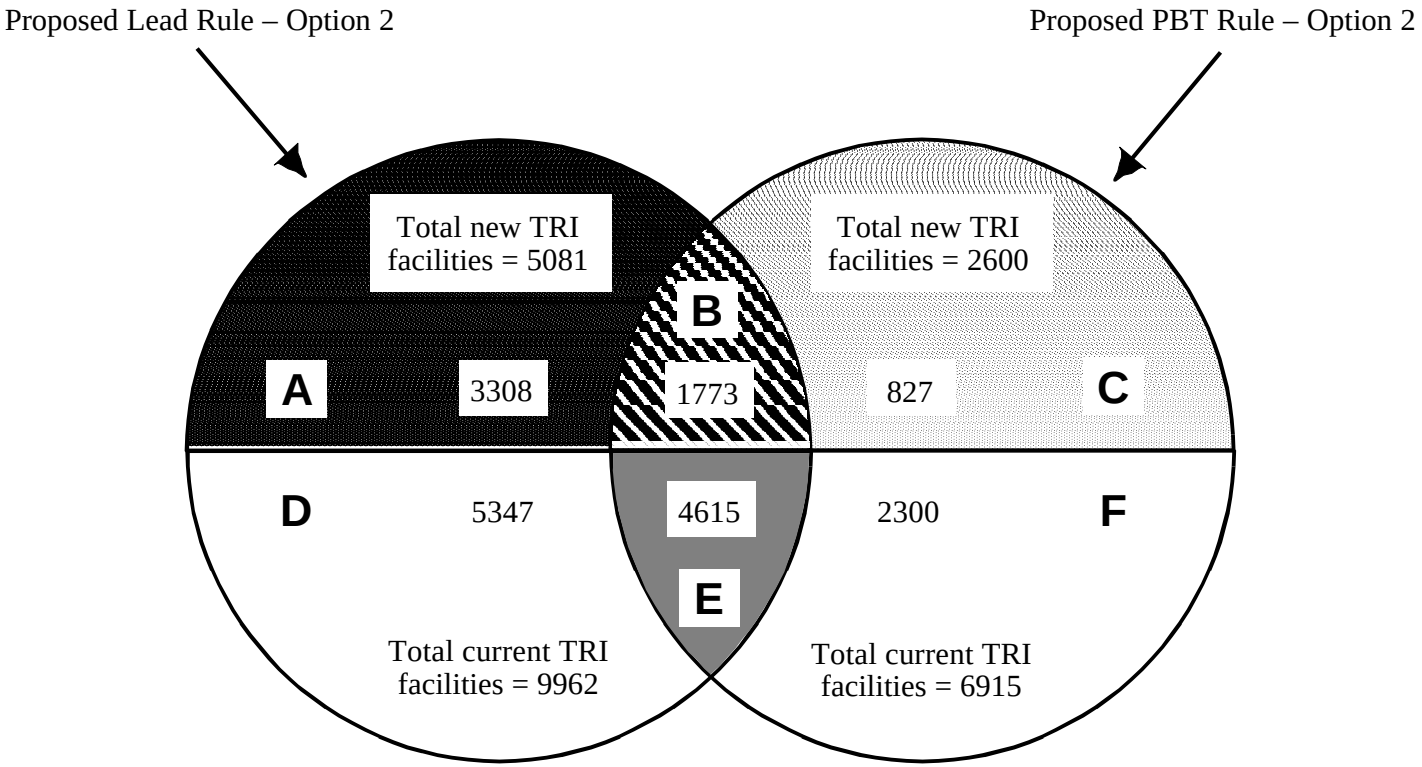
2,600 (first time filers)
\+ 6,915 (current filers)
= 9,515 facilities at the preferred option

Unique filers affected by the Lead <u>and</u> PBT proposals = Areas A + B + C + D + E + F, or

5,908 (unique first time filers affected by both proposals)
\+ 12,262 (unique current filers affected by both proposals)
= 18,170 facilities at the preferred options

The effect of the overlap in numbers of facilities on industry costs (via rule familiarization costs for first time filers) is addressed in Chapter 4.

FIGURE 3-1
FACILITY OVERLAP UNDER THE LEAD AND PBT PROPOSALS



Note: Figure is not to scale

CHAPTER 4
COST ESTIMATES

This chapter describes the methodology used to estimate the costs that industry and EPA may incur as a result of the proposed lead rule. Section 4.1 describes the methodology used to estimate the total industry costs. Section 4.2 details the estimated costs to EPA of implementing the expanded program. Section 4.3 summarizes the total costs. Section 4.4 discusses the overlap in the number of affected facilities under the proposed lead and PBT rules and the effect on the total costs associated with the proposed lead rule.

4.1 INDUSTRY COST ESTIMATES

In this section, the costs that may be incurred by industry as a result of modifying TRI reporting requirements are estimated. These costs are presented for the preferred option as well as for three additional regulatory options. Section 4.1.1 describes the methodology used to estimate total industry costs for each option. Section 4.1.2 discusses the unit cost estimates for each of the activities that a facility may need to perform to comply with the section 313 reporting requirements. Section 4.1.3 presents the total cost estimate of each option for industry. Section 4.1.4 discusses the costs incurred by publicly-owned electric utilities. Finally, Section 4.1.5 describes the transfer payments and non-monetized costs associated with this rulemaking.

4.1.1 METHODOLOGY

Total industry costs were calculated using the following four-step procedure:

Step 1: Identify and describe the tasks that potentially affected facilities will have to perform to comply with the section 313 requirements.

Step 2: For each task, estimate the hours of managerial, technical, and clerical labor needed to complete it. Based on typical labor rates, calculate the unit cost of each task for the first year of compliance, when some learning must take place, and subsequent years, when less time is needed because facilities are more familiar with the tasks.

Step 3: Estimate the number of unique facilities that will perform each task. Estimate the number of facilities that will perform some portion of the required tasks in order to determine that they do not have to comply with the reporting requirements. Estimate the number of reports to be filed in each industry group.

Step 4: For each task, multiply the unit cost by the number of unique facilities and/or reports, and then sum the results to compute the total industry costs for the first year and subsequent years.

The tasks associated with TRI reporting under the proposed lead rule include:

- **Compliance Determination:** Facilities must determine whether they meet the criteria for reporting on lead and lead compounds at the lower thresholds. This task includes the time required to become familiar with the definitions, exemptions, and new threshold requirements under the TRI program and to conduct preliminary threshold calculations to determine if the facility is required to report.
- **Rule Familiarization:** Facilities that are reporting under section 313 for the first time due to the proposed rule must read the reporting package and become familiar with the reporting requirements.
- **Report Completion:** Facilities must gather data and perform calculations to provide the information required on the form.
- **Mailing and Recordkeeping:** Facilities must maintain recordkeeping systems and mail the report to EPA and the State.

The skills required to comply with the section 313 reporting requirements (including the requirements associated with section 6607 of the PPA) will vary from facility to facility depending upon factors such as the complexity of the facility's processes, the type of use and disposition of lead and lead compounds at the facility, and transfers from the facility. Those responsible for reporting may often have engineering, scientific, or technical backgrounds. Compliance does not, however, necessarily require an engineering or other similar degree. At a minimum, an understanding of the facility's chemical purchases and production processes is required. Necessary skills may include the ability to evaluate and interpret records, understand material safety data sheets, and determine throughput or production volumes. Depending on the facility, estimates may be calculated using existing data collected under federal, state, or local regulations; emissions factors; design data supplied by the equipment manufacturer; mass balance techniques; or engineering calculations. Each technique requires varying skills and levels of sophistication to complete. In some instances, EPA guidance documents may supplant the need for a particular skill.

The next section discusses how the unit cost associated with each of these specific tasks was estimated.

4.1.2 UNIT COST ESTIMATES

This section explains how the cost estimates, or unit costs, were developed for each task that facilities might have to perform under the proposed rule. Depending on whether the unit cost is report- or facility-specific, total costs for a task can be calculated by multiplying the unit cost by the number of reports for which the task must be performed or by the number of facilities performing it. The estimated number of unique facilities and lead reports expected under each regulatory option is presented in Table 4-1. The estimated unit cost for each of the tasks is presented in Table 4-2.

Each cost estimate is made up of two components: the unit time estimates (i.e., number of labor hours required of each type of personnel to complete a task); and the hourly wage rates for each level of personnel. The unit time estimates are taken from the Economic Analysis (EA) of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (USEPA, 1997).

Hourly wage rates are divided into three categories: managerial, technical, and clerical. Updated 1998 hourly labor rates, including fringe benefits and overhead, were developed by EPA for each of these categories using the same methodology used in the Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (USEPA, 1997). The new wage rates were calculated using current data on salaries and benefits for these three labor categories.

Wage data used in developing the basic wage rates for this analysis were derived from 1996 wage information published by the Bureau of Labor Statistics (BLS) for all goods-producing, private industries (USDL, 1998). The managerial, technical, and clerical wage rates are based on wage information for four BLS occupation categories: engineers, accountants, attorneys, and secretaries. As presented in Table 4-3, the managerial and technical level wage rates are composites of the BLS wage rates for several occupation categories and levels. The managerial level wage rate is a composite of the wage rates of Engineers (levels VI-VIII),Accountants (levels V-VI), and Attorneys (levels IV-VI).[17] The technical level wage is a composite of the wage rates of Engineers (levels III-VIII) and Accountants (levels (III-VI).[18] The clerical wage rate is an average of all the clerical wage levels provided by BLS (i.e., levels I-V).

[17]Managerial labor is assumed to be composed of operational labor, including engineers or chemists at the plant manager, facility research manager, or higher levels, legal managers, and financial managers.

[18]Technical labor is assumed to be composed of operational labor, including senior engineers or chemists equivalent to head process or project engineer, and financial labor, such as accountants. It is assumed that operational labor is used at a five-to-one ratio with financial labor.

TABLE 4-1
ESTIMATED NUMBER OF UNIQUE FACILITIES AND CHEMICAL REPORTS UNDER THE PROPOSED LEAD RULE

SIC Code	Option 1	Option 2 (Preferred Option)	Option 3	Option 4
	Number of Facilities and Reports	Number of Facilities and Reports	Number of Facilities and Reports	Number of Facilities and Reports
10 — Metal Mining (except 1011, 1081, 1094)	0	0	0	0
12 — Coal Mining (except 1241)	321	321	321	321
4911—Electric Services (Coal and Oil Facilities Only)	246	227	196	157
4931—Electric & Other Services (Coal and Oil Facilities Only)	150	135	111	83
4939—Combination Utilities (Coal and Oil Facilities Only)	18	16	12	8
4953 — RCRA Subtitle C TSDFs Only	80	74	64	36
5169 — Chemical Wholesalers	0	0	0	0
5171 — Bulk Petroleum	2,459	980	621	55
7389 — Solvent Recovery Only	26	24	22	14
20-39 — Manufacturing Facilities	19,323	13,266	7,415	2,231
TOTAL	**22,623**	**15,043**	**8,762**	**2,905**

TABLE 4-2
UNIT TIME AND COST ESTIMATES FOR ACTIVITIES PERFORMED BY INDUSTRY UNDER THE PROPOSED LEAD RULE

Activity	Unit Time Estimates (Hours) (per report or per facility)			Unit Cost[a] (1998 Dollars)
	Managerial	Technical	Clerical	
First Year				
Rule Familiarization[b]	12.0	22.5	0.0	$2,489
Compliance Determination[b]	4.0	12.0	0.0	$1,119
Form R Completion[c]	20.9	45.2	2.9	$4,796
Recordkeeping/Mailing[c]	0.0	4.0	1.0	$283
Subsequent Years				
Compliance Determination[b]	1.0	3.0	0.0	$280
Form R Completion[c]	14.3	30.8	2.0	$3,274
Recordkeeping/Mailing[c]	0.0	4.0	1.0	$283

[a] Based on loaded hourly wage rates of $86.86, $64.30, and $25.63 for managerial, technical, and clerical labor, respectively.

[b] The unit cost for this activity is estimated at the facility level. It is treated as a fixed cost that does not vary with the number of chemicals handled or reported by a facility.

[c] The unit cost for this activity is estimated to vary with the number of reports submitted. The total cost for this activity at a facility is calculated by multiplying the unit cost by the number of reports submitted by that facility.

Sources: U.S.EPA (1997). *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting*. April.

TABLE 4-3
LOADED HOURLY WAGE RATES BY LABOR CATEGORY

Labor Category	Occupation (levels)	June 1996 Average Salary	Weighting Factor	1996 Composite Salary	ECI Ratio 6/96:3/98	1998 Adjusted Salary	1997 Benefits (% Salary)	Overhead (%Salary)	1998 Loaded Annual Salary	1998 Loaded Hourly Rate
	Engineer (VI-VIII)	$104,971	10/17	$61,748						
	Attorney (IV-VI)	$116,255	5/17	$34,193						
	Accountant (V-VI)	$82,030	2/17	$9,651						
Managerial	Composite			$105,592	1.087	$114,779	40.4%	17.0%	$180,662	$86.86
	Engineer (III-VIII)	$83,243	5/6	$69,369						
	Accountant (III-VI)	$65,780	1/6	$10,963						
Technical	Composite			$80,332	1.055	$84,750	40.8%	17.0%	$133,736	$64.30
Clerical	Secretarial (I-V)	$31,502	1/1	$31,502						
	Composite			$31,502	1.063	$33,487	42.2%	17.0%	$53,311	$25.63

[a] Composite Salaries are determined by multiplying average salaries by the weighting factor and summing across occupations.

Sources: U.S. Department of Labor, Bureau of Labor Statistics. Occupational Compensation Survey, National Summary 1996 (1998). U.S. Department of Labor, Washington, D.C., March. Bulletin 2497, Tables A-1, D-1 and D-3, 1998.
U.S. Department of Labor, Bureau of Labor Statistics. Employer Costs for Employee Compensation — March 1997. U.S. Department of Labor, Washington D.C., October 21. USDL News Release: 97-371, Table 11, 1997
U.S. Department of Labor, Bureau of Labor Statistics (1998). Employment Cost Index—March 1998. U.S. Department of Labor, Washington D.C., April 30. USDL News Release 98-170, Table 6, 1998.

The weighting factors used to develop the managerial and technical wage rates are based on information provided by the chemical industry and chemical industry trade associations on the typical fraction of total reporting effort that is accounted for by each specific BLS occupation category.[19]

The 1996 composite annual salary estimates were adjusted to first-quarter 1998 dollars using the Employment Cost Index (ECI) for white-collar occupations in private industries (US DL, 1998). The 1998 adjusted, composite salary for the managerial, technical, and clerical labor categories was then multiplied by benefits and overhead factors to estimate a 1998 loaded, annual salary. Detailed benefits data for white-collar occupations in private, goods-producing industries were used to account for the additional cost of benefits for managerial, technical, and clerical labor (USDL, 1998). The overhead factor of 17 percent is based on information provided by the chemical industry and chemical industry trade associations. The loaded annual salary was then divided by 2,080 hours (i.e., the average annual number of hours for a full-time employee) to derive the loaded, hourly wage rates used in this analysis for each labor category. The hourly wage rates are $86.86 for managerial personnel, $64.30 for technical personnel, and $25.63 for clerical personnel, all in 1998 dollars.

The remainder of this section discusses the costs associated with each specific industry task. Activities are organized into two categories: per facility costs and per report costs. As noted previously, these costs are summarized in Table 4-2.

Per Facility Costs

Compliance Determination

Under the proposed rule, a facility must report under section 313 if it: (a) is within SIC codes covered by the TRI program; (b) has 10 or more employees or the equivalent of 10 full-time employees; and (c) manufactures, processes, or uses lead or lead compounds above the proposed threshold quantity. All facilities in TRI covered industry groups must determine if they meet these criteria. It is assumed that facilities will not incur any incremental costs to make determinations regarding the first two criteria. The third determination, however, would require the management and technical staff to determine the types of PBT chemicals used at the facility, and whether they are manufactured, processed, or otherwise used above threshold levels.

The estimated number of facilities performing a compliance determination in the first year and in subsequent years in each of the SIC codes and/or industry groups is presented in Table 4-4. For all industry groups, the number of facilities performing compliance determinations corresponds to the estimated number of facilities in each industry group with greater than or equal to 10 FTEs. The total number of facilities for each industry group was taken

[19]The current methodology does not include chemists in estimating the composite wage rates because updated information on wage levels for chemists was not available from BLS. The Engineer salary information is expected to be similar to Chemist salary information. In addition, BLS data for Level VI attorneys in goods-producing industries were not available, so wages for all private industry level VI attorneys were used instead.

from information collected by the US Department of Commerce (USDOC, 1995) and from the RIA for the addition of certain industry groups to EPCRA section 313 (USEPA, 1997).

TABLE 4-4
NUMBER OF FACILITIES CONDUCTING COMPLIANCE DETERMINATIONS
ALL OPTIONS

SIC Code	First and Subsequent Years
10—Metal Mining (except 1011, 1081, 1094)	268
12—Coal Mining (except 1241)	1,749
4911/4931/4939—Electric Services (Coal and Oil Facilities Only)	977
4953—RCRA Subtitle C TSDF's Only	162
5169—Chemical Wholesalers	2,801
5171—Bulk Petroleum	3,842
7389—Solvent Recovery Only	191
20-39—Manufacturing Facilities	180,507
TOTAL	190,497

To make the compliance determination, a facility must first review whether it manufactures, processes, or otherwise uses lead and lead compounds in any quantity. If it does, then it must make a threshold determination to ascertain whether it manufactures, processes, or uses more than the threshold amount of lead and lead compounds. Since lead and lead compounds are considered to be a highly persistent and bioaccumulative chemical, the preferred reporting threshold presented in the regulatory text is 10 pounds manufactured, processed, or otherwise used. Taken together with other changes to the reporting requirements such as elimination of the *de minimis* exemption and alternate reporting threshold, this reporting threshold forms the preferred option.

The time spent making threshold determinations will involve a detailed set of calculations and is expected to be a substantial effort. In the Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (hereafter known as the industry expansion EA), it was estimated that compliance determination would require one hour of managerial time and three hours of technical time to complete the compliance determination in subsequent years (USEPA, 1997). In the industry expansion EA it was also assumed that facilities would require four times as many labor hours to complete a compliance determination in the first year compared to subsequent years (USEPA, 1997). Applying this four-fold factor yields estimates of four hours of managerial time and twelve hours of technical time per facility to make the compliance determination in the first year.

In both first and subsequent years, it is unclear whether making a compliance determination for lead and lead compounds would be harder than, easier than, or equally as difficult as making the determination for the current list of over 600 chemical and chemical compounds. Compliance determination might be more complicated in situations where lead or lead compounds are a byproduct or an impurity of a facility's main production processes, or are produced inadvertently outside a facility's main production processes. By contrast, for very low thresholds it may be easy for facilities to ascertain that they manufacture, process or use lead and lead compounds in at least some quantity. To generate an extremely precise burden estimate for compliance determination, the particular circumstances at each facility using PBT chemicals would have to be known. Such a detailed understanding of per facility chemical usage was not possible for this analysis. Therefore, it is assumed that the average time needed by a facility for compliance determination will be proportional to the number of reports submitted for lead and lead compounds in the first year and in all subsequent years. The estimated number of new reports under the preferred option (Option 2) as well as the other three options is shown in Table 4-1. The ratio of new reports expected under the proposed lead rule to total reports before proposal under current reporting requirements is used as a weighting factor to adjust the unit cost estimate for compliance determination. The adjusted unit cost estimates for each of the options in first and subsequent years is presented in Table 4-5.

TABLE 4-5
ADJUSTED UNIT COSTS FOR COMPLIANCE DETERMINATION BY OPTION

	Expected Number of Lead Reports	Total Number of Reports[20]	Weighting Factor	Adjusted Unit Cost for Compliance Determination
FIRST YEAR				
Option 1	22,623	117,889	0.19	$212.61
Option 2 (Preferred)	15,043	117,889	0.13	$145.47
Option 3	8,762	117,889	0.07	$78.33
Option 4	2,905	117,889	0.02	$22.38
SUBSEQUENT YEAR				
Option 1	22,623	117,889	0.19	$53.20
Option 2 (Preferred)	15,043	117,889	0.13	$36.40
Option 3	8,762	117,889	0.07	$19.60
Option 4	2,905	117,889	0.02	$5.60

To calculate the incremental cost of compliance determination for the proposed lead rule by industry group, the adjusted unit compliance cost is multiplied by the number of facilities in the industry group with more than 10 FTEs.

Rule Familiarization

If a facility will be reporting under the section 313 requirements for the first time due to the proposed lead rule, facility staff must review and comprehend the reporting requirements. At a minimum, this effort will involve reading the instructions to the Toxic Chemical Release Inventory Reporting Form R, however, it may also involve consulting EPA guidance documents, attending a training course, and/or calling the EPCRA technical hotline. The cost associated with rule familiarization occurs only in the first year that a facility becomes subject to reporting. In subsequent years, staff are assumed to be familiar with the requirements that apply to their

[20] In 1996, an estimated 71,735 reports were submitted to TRI. In addition, an estimated 46,154 reports will be submitted by industries affected by the TRI Industry Expansion Rule. As a result, the total number of reports is estimated to be 117,889.

facility. Thus, the facility would no longer bear this cost. Similarly, facilities reporting on lead and lead compounds that already report on one or more existing TRI chemicals will not incur a rule familiarization cost.

It is estimated that facilities reporting under section 313 for the first time will need to make a one-time expenditure of 34.5 hours for rule familiarization. This burden estimate is comprised of 12 hours of management time and 22.5 hours of technical time (USEPA, 1997). Due to the recent TRI industry expansion, all of the facilities expected to report in the non-manufacturing SIC Codes will already be reporting to TRI. Therefore, first time filers are limited to facilities in the manufacturing industry group (SIC Codes 20-39). To generate an estimate of first time filers it is assumed that the distribution of reports per facility will not change after the lead rule is promulgated. It is further assumed that if a facility files a single report, and it is for lead and lead compounds, then the facility must be new to the TRI system. Therefore, the unique number of facilities submitting reports for lead and lead compounds is multiplied by the percentage of reporters that filed only one report in 1996 (38.3%). The cost of rule familiarization is then calculated by applying the unit cost as shown in Table 4-2 to the number of first time filers presented in Table 4-6.

TABLE 4-6
NUMBER OF UNIQUE FACILITIES AND FIRST TIME FILERS UNDER THE PROPOSED LEAD RULE

	Unique Number of Manufacturing Facilities	Percent of Single Filers in 1996	Number of First Time Filers
FIRST YEAR			
Option 1	19,323	38.3	7,401
Option 2 (preferred)	13,266	38.3	5,081
Option 3	7,415	38.3	2,840
Option 4	2,231	38.3	854

Per Report Costs

Form R Completion

Given the persistent, bioaccumulative, and toxic nature of lead and lead compounds, facilities will not be able to take advantage of the alternate manufacture, process, or otherwise use threshold of one million pounds under the proposed lead rule. All facilities filing reports on lead and lead compounds at the lower reporting thresholds must use the Form R.

Facilities that determine they must report on lead and lead compounds under the section 313 reporting requirements will incur costs to retrieve, process, review, and transcribe the information necessary to complete each report. Most of the time spent on form completion is used to calculate releases, transfers, and other waste management information; relatively little time is required to copy information to the form. Form R completion will require more time in the first year than in subsequent years. In subsequent years, facilities will need to verify and update data, review previous calculations, and modify the information reported on the previous year's Form R, rather than estimate or retrieve data for the first time.

The estimated time for report completion equals 47 hours (14.3 hours of managerial, 30.8 hours of technical, and 2 hours of clerical time) (USEPA, 1997). This estimate represents a "subsequent-year" cost, because facilities already have experience preparing the form.

Following the methodology employed in the industry expansion EA, in order to estimate the report completion time for the first year, the subsequent-year cost was multiplied by the ratio of first-year cost to subsequent-year cost (USEPA, 1997). The time required to complete a report in the first year is estimated to be 147 percent of the time required in subsequent years. Applying this factor to the report completion estimate above, the time estimate required for reporting in the first year is 69.1 hours per report. Assuming the same labor mix indicated in the industry expansion EA, the 69.1 hours is assumed to be comprised of 20.9 hours of management time, 45.2 hours of technical time, and 2.9 hours of clerical time.

The estimated number of reports to be filed by each industry is indicated in Table 4-1 for each option. The total cost associated with Form R completion is calculated by multiplying the unit cost indicated in Table 4-1 by the number of expected reports under each option.

Mailing and Recordkeeping

After a facility has completed the form, it incurs additional labor costs for recordkeeping associated with filing a Form R. Recordkeeping allows a facility to use the information in making calculations in subsequent years, and as documentation in the event it receives a compliance audit. Facilities must maintain records such as estimation methodology and calculations, engineering reports, inventory, incident and operating logs, and any other supporting materials needed to provide the information required on the Form R.

Mailing and recordkeeping require five hours per Form R (four hours of technical and one hour of clerical time)(USEPA, 1997). Recordkeeping and mailing costs are not expected to vary between the first and subsequent years. Therefore, the five hours per Form R is assumed for both first and subsequent years. The estimated number of reports requiring recordkeeping and mailing is identical to the number of Form Rs expected to be filed as presented in Table 4-1. Appendix A describes how the number of reports was estimated for each industry group.

4.1.3 TOTAL INDUSTRY COSTS

The total industry costs associated with the proposed lead rule include the costs of rule familiarization, compliance determination, Form R completion, recordkeeping, and mailing. To compute the industry-wide cost of each compliance activity, the unit cost for each task is multiplied by the relevant number of facilities and/or reports associated with that task. Tables 4-7a and 4-7b present the total cost of the proposed lead rule in the first and subsequent years for the affected industry groups under Option 1. Tables 4-8a and 4-8b present the total cost in the first and subsequent years under the preferred option: Option 2. Tables 4-9a and 4-9b present the total cost in the first and subsequent years under Option 3. Finally, Tables 4-10a and 4-10b present the total cost in the first and subsequent years under Option 4.

TABLE 4-7a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 1 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$58	$0	$0	$58
12—Coal Mining (except 1241)	$0	$376	$1,540	$91	$2,006
4911—Electric Services (Coal and Oil Facilities Only)	$0	$110	$1,180	$70	$1,360
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$92	$719	$42	$854
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$7	$86	$5	$99
4953—RCRA Subtitle C TSDF's Only	$0	$35	$384	$23	$441
5169—Chemical Wholesalers	$0	$602	$0	$0	$602
5171—Bulk Petroleum	$0	$825	$11,794	$695	$13,314
7389—Solvent Recovery Only	$0	$41	$125	$7	$173
20-39—Manufacturing Industries	$18,421	$38,763	$92,674	$5,465	$155,323
TOTAL	$18,421	$40,908	$108,501	$6,398	$174,229

TABLE 4-7b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 1 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$14	$0	$0	$14
12—Coal Mining (except 1241)	$0	$94	$1,051	$91	$1,236
4911—Electric Services (Coal and Oil Facilities Only)	$0	$28	$805	$70	$903
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$23	$491	$42	$557
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$2	$59	$5	$66
4953—RCRA Subtitle C TSDF's Only	$0	$9	$262	$23	$293
5169—Chemical Wholesalers	$0	$150	$0	$0	$150
5171—Bulk Petroleum	$0	$206	$8,050	$695	$8,952
7389—Solvent Recovery Only	$0	$10	$85	$7	$103
20-39—Manufacturing Industries	$0	$9,691	$63,260	$5,465	$78,415
TOTAL	$0	$10,227	$74,063	$6,398	$90,689

TABLE 4-8a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 2 — PREFERRED OPTION — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$38	$0	$0	$38
12—Coal Mining (except 1241)	$0	$250	$1,540	$91	$1,880
4911—Electric Services (Coal and Oil Facilities Only)	$0	$73	$1,089	$64	$1,226
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$61	$647	$38	$747
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$5	$77	$5	$86
4953—RCRA Subtitle C TSDF's Only	$0	$23	$355	$21	$399
5169—Chemical Wholesalers	$0	$400	$0	$0	$400
5171—Bulk Petroleum	$0	$549	$4,700	$277	$5,526
7389—Solvent Recovery Only	$0	$27	$115	$7	$149
20-39—Manufacturing Industries	$12,647	$25,775	$63,625	$3,752	$105,798
TOTAL	$12,647	$27,202	$72,147	$4,255	$116,250

TABLE 4-8b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 2 — PREFERRED OPTION — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$10	$0	$0	$10
12—Coal Mining (except 1241)	$0	$62	$1,051	$91	$1,204
4911—Electric Services (Coal and Oil Facilities Only)	$0	$18	$743	$64	$826
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$15	$442	$38	$495
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$1	$52	$5	$58
4953—RCRA Subtitle C TSDF's Only	$0	$6	$242	$21	$269
5169—Chemical Wholesalers	$0	$100	$0	$0	$100
5171—Bulk Petroleum	$0	$137	$3,208	$277	$3,623
7389—Solvent Recovery Only	$0	$7	$79	$7	$92
20-39—Manufacturing Industries	$0	$6,444	$43,430	$3,752	$53,626
TOTAL	$0	$6,800	$49,248	$4,255	$60,303

TABLE 4-9a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 3 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$22	$0	$0	$22
12—Coal Mining (except 1241)	$0	$145	$1,540	$91	$1,776
4911—Electric Services (Coal and Oil Facilities Only)	$0	$43	$940	$55	$1,038
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$36	$532	$31	$600
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$3	$58	$3	$64
4953—RCRA Subtitle C TSDF's Only	$0	$13	$307	$18	$339
5169—Chemical Wholesalers	$0	$233	$0	$0	$233
5171—Bulk Petroleum	$0	$320	$2,978	$176	$3,474
7389—Solvent Recovery Only	$0	$16	$106	$6	$128
20-39—Manufacturing Industries	$7,069	$15,013	$35,563	$2,097	$59,742
TOTAL	$7,069	$15,844	$42,023	$2,478	$67,414

TABLE 4-9b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 3 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$6	$0	$0	$6
12—Coal Mining (except 1241)	$0	$36	$1,051	$91	$1,178
4911—Electric Services (Coal and Oil Facilities Only)	$0	$11	$642	$55	$708
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$9	$363	$31	$404
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$1	$39	$3	$43
4953—RCRA Subtitle C TSDF's Only	$0	$3	$210	$18	$231
5169—Chemical Wholesalers	$0	$58	$0	$0	$58
5171—Bulk Petroleum	$0	$80	$2,033	$176	$2,289
7389—Solvent Recovery Only	$0	$4	$72	$6	$82
20-39—Manufacturing Industries	$0	$3,753	$24,275	$2,097	$30,126
TOTAL	$0	$3,961	$28,685	$2,478	$35,124

TABLE 4-10a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 4 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$7	$0	$0	$7
12—Coal Mining (except 1241)	$0	$48	$1,540	$91	$1,679
4911—Electric Services (Coal and Oil Facilities Only)	$0	$14	$753	$44	$812
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$12	$398	$23	$433
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$1	$38	$2	$42
4953—RCRA Subtitle C TSDF's Only	$0	$4	$173	$10	$187
5169—Chemical Wholesalers	$0	$77	$0	$0	$77
5171—Bulk Petroleum	$0	$106	$264	$16	$385
7389—Solvent Recovery Only	$0	$5	$67	$4	$76
20-39—Manufacturing Industries	$2,127	$4,978	$10,700	$631	$18,435
TOTAL	$2,127	$5,253	$13,933	$822	$22,134

TABLE 4-10b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
OPTION 4 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$2	$0	$0	$2
12—Coal Mining (except 1241)	$0	$12	$1,051	$91	$1,154
4911—Electric Services (Coal and Oil Facilities Only)	$0	$4	$514	$44	$562
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$3	$272	$23	$298
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$0	$26	$2	$29
4953—RCRA Subtitle C TSDF's Only	$0	$1	$118	$10	$129
5169—Chemical Wholesalers	$0	$19	$0	$0	$19
5171—Bulk Petroleum	$0	$26	$180	$16	$222
7389—Solvent Recovery Only	$0	$1	$46	$4	$51
20-39—Manufacturing Industries	$0	$1,244	$7,304	$631	$9,179
TOTAL	$0	$1,313	$9,510	$822	$11,645

4.1.4 COSTS FOR PUBLICLY-OWNED FACILITIES

Municipal electric utilities in SIC code 4911 are the only publicly-owned facilities expected to be affected by the proposed lead rule. Table 4-11 presents the estimated number of affected municipal electric utilities and the estimated number of reports from these facilities. Table 4-12 presents the cost to these facilities for the first year and for subsequent years. These facilities, reports, and costs are included in the electric services (SIC codes 4911, 4931, and 4939) estimates in the other summary tables in this chapter.

TABLE 4-11
REPORTING ESTIMATES FOR PUBLICLY-OWNED FACILITIES
- ALL OPTIONS

Option	Facilities Affected/Total Reports
Option 1	39
Option 2 (Preferred)	36
Option 3	31
Option 4	24

TABLE 4-12
ESTIMATED COSTS FOR PUBLICLY-OWNED FACILITIES
ALL OPTIONS
(Thousands of 1998 dollars)

Option	First Year	Subsequent Years
Option 1	$209	$141
Option 2 (Preferred)	$190	$130
Option 3	$162	$111
Option 4	$123	$86

4.1.5 TRANSFER PAYMENTS AND NON-MONETIZED COSTS

There are various state and federal requirements that are linked to the EPCRA section 313 reporting requirements. The associated requirements include state taxes and fees, state pollution prevention planning requirements, and special requirements for certain National Pollutant Discharge Elimination System (NPDES) storm water permits. These requirements are discussed in Appendix N (Associated Requirements) of the Economic Analysis of the Proposed Rule to Modify Reporting of PBT Chemicals Under EPCRA Section 313 (U.S. EPA, 1998). The costs calculated in this chapter include only those activities that are required by this rule. Although the fees, taxes, and pollution prevention requirements are linked to EPCRA section 313 reporting, they are not required by this rulemaking.

4.2 EPA COSTS

This section examines costs EPA would incur due to the proposed lead rule. By lowering the reporting thresholds for lead and lead compounds, EPA will incur costs for data processing, outreach and training, information dissemination, policy and petitions, and compliance and enforcement. These activities require additional EPA personnel, as well as extramural funds (for example, for contractors to perform data processing).

One way to characterize EPA's resource requirements is in terms of the number of data elements that must be processed. A data element is a single unit of information reported on Form R, such as the facility address or the number of pounds of the chemical released to air, that is entered into the TRI Information Management System. There are an average of 103 data elements entered into the system for each Form R. EPA is estimated to require 2.61 employees (also known as full time equivalents, or FTEs) and $551,600 in extramural funds for each additional million data elements that are added.[21] Assuming that half of the EPA employees are at the general pay scale grade 12 (i.e., GS-12, at a salary of $47,066) and half are at grade 13 (i.e., GS-13, at a salary of $55,969), and using a loading factor of 1.6 to account for employee benefits and other cost factors, yields an estimated annual cost of $82,428 per EPA employee.

Based on the number of reports predicted for the preferred option, and assuming that these reports will also contain an average of 103 data elements each, this yields an estimate of 1.5 million data elements. This translates into an estimate of $1.2 million per year for EPA costs in subsequent years. These results are summarized in Table 4-13. The additional first-year costs to be incurred by EPA for outreach, training, and guidance are roughly estimated at $400,000. These costs are expected to be incurred in the first year only and are in addition to the costs presented in Table 4-13.

[21]See Appendix K of the *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting (*April, 1997) for details of EPA's employee and cost model for TRI.

TABLE 4-13
SUMMARY OF INCREMENTAL EPA COSTS
PREFERRED OPTION
(Thousands of 1998 dollars)

DESCRIPTION	REPORTING REQUIREMENTS
# Data Elements	1.5 million
FTEs	4
Cost of FTEs	$333
Extramural Cost	$855
Total EPA Costs	**$1,188**

4.3 TOTAL COSTS

The estimated total cost to industry and EPA of the proposed lead rule is $116 million in the first year and $60 million in subsequent years. Table 4-14 summarizes the total costs to industry and EPA of the proposed lead rule.

TABLE 4-14
SUMMARY OF TOTAL COSTS
OF THE PROPOSED LEAD RULE
(Millions of 1998 dollars)

DESCRIPTION	First Year	Subsequent Years
Industry Costs	$116	$60
EPA Costs	$1.6	$1.2
TOTAL COSTS	$118	$61

4.4 POTENTIAL OVERLAP IN TOTAL COSTS ASSOCIATED WITH THE PROPOSED LEAD RULE AND THE PROPOSED PBT RULE

As mentioned in Chapter 3, EPA has recently proposed to modify current reporting requirements for certain persistent bioaccumulative toxic (PBT) chemicals (64 FR 688). Because the PBT proposal is not yet final, the reports associated with the proposed PBT rule are not considered to be part of current (or "baseline") reporting.[22] However, some of the facilities potentially affected by the proposed lead rule may also be affected by the proposed PBT rule. If both of these rules are finalized as proposed, certain facilities may file additional reports on lead or lead compounds, as well as on one or more of the chemicals in the proposed PBT rule. The ultimate outcome of these separate proposals is, however, uncertain at present. Therefore, certain facility-specific reporting costs have been included in the economic analysis for this proposal and in the economic analysis of the PBT proposal—even though these costs can be incurred only once per facility.[23]

Specifically, at the preferred options for both proposals, 1,773 first time filers would be expected to file TRI reports for one or more PBT chemicals and for lead and lead compounds due to the new reporting thresholds and requirements in the proposed PBT rule and in this proposed rule for lead and lead compounds. Rule familarization costs associated with these 1,773 facilities are estimated at $4.4 million in the first year only (1,773 x $2,489). Therefore, upon finalization the aggregate cost of the two proposals may be less than the sum of the industry costs as presented in the respective economic analyses due to this potential double-counting of reporting costs for first time filers. However, because the PBT rule is not yet final, rule familiarization costs associated with these potentially overlapping facilities are included in the total costs for the lead rule.

[22] Appendix B contains a description of how the total number of affected facilities is estimated if both rules are considered together.

[23] Appendix C presents the total cost of the PBT and lead proposals.

LITERATURE CITED

U.S. Department of Commerce, Bureau of the Census. 1995 County Business Patterns, Washington, D.C.: Government Printing Office, 1995.

U.S. Department of Labor, Bureau of Labor Statistics. Employer Costs for Employee Compensation — March 1997. U.S. Department of Labor, Washington D.C., October 21. USDL News Release: 97-371, Table 11, 1997

U.S. Department of Labor, Bureau of Labor Statistics (1998). Employment Cost Index—March 1998. U.S. Department of Labor, Washington D.C., April 30. USDL News Release 98-170, Table 6, 1998.

U.S. Department of Labor, Bureau of Labor Statistics. Occupational Compensation Survey, National Summary 1996 (1998). U.S. Department of Labor, Washington, D.C., March. Bulletin 2497, Tables A-1, D-1 and D-3, 1998.

U.S. EPA. Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting. April, 1997.

U.S. EPA. Economic Analysis of the Proposed Rule to Modify Reporting of Persistent Bioaccumulative Toxic Chemicals Under EPCRA Section 313. December, 1998.

CHAPTER 5
ESTIMATED IMPACTS OF THE RULE

This chapter addresses the potential impacts of the proposed lead rule on small entities, as well as on certain demographic groups. Section 5.1 provides a description of the potential impacts on small entities at the preferred option. Section 5.2 discusses the overlap in the number of affected facilities under the proposed lead and PBT rules and its effect on the estimated impacts of the proposed lead rule. Section 5.3 considers whether the proposed rule adversely affects minorities and/or disadvantaged populations or children.

5.1 IMPACTS ON SMALL ENTITIES

The Regulatory Flexibility Act (RFA) of 1980 (5 U.S.C. § 601 *et. seq.*) requires Federal agencies to assess the effects of regulations on small entities and, in some instances, to examine alternatives to the regulations that may reduce adverse economic effects on significantly impacted small entities. The RFA requires agencies to prepare an initial and final regulatory flexibility analysis for each rule unless the Agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

Since 1980, the RFA has required Federal agencies to assess the economic impacts of their actions on small entities, including businesses, nonprofit agencies, and governments. Section 604 of the RFA, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, requires EPA to perform a final regulatory flexibility analysis for the proposed rule unless the Agency certifies under section 605(b) that the regulatory action will not have a significant economic impact on a substantial number of small entities. The RFA does not specifically define "a significant economic impact on a substantial number" of small entities.

Section 5.1.1 provides the definition of a small entity for each industry group covered under the proposed lead rule. Section 5.1.2 describes the general methodology used to determine if the proposed lead rule will result in significant economic impacts on a substantial number of small entities. Section 5.1.3 describes the revenue data used in this analysis. Section 5.1.4 describes the specific approach used to analyze the impacts on each industry group and presents the results for each of these analyses. Section 5.1.5 summarizes the results for all affected small entities.

5.1.1 DEFINITIONS OF SMALL ENTITIES

The RFA utilizes the definition of "small business" found in the Small Business Act, which authorizes the Small Business Administration (SBA) to further define "small business" by

regulation. For this analysis, EPA is using the Small Business Administration's (SBA's) definition of a small business for each industry.[24]

SBA's small business size standards vary by industry. In establishing size standards, SBA considers a number of economic and market characteristics that may allow a business concern to exercise dominance in an industry. Size standards are based on criteria, such as annual receipts or number of employees, that represent a measure of these characteristics. These standards represent the largest size that a for-profit enterprise (together with its affiliates) may be and qualify as a small business. For the industries included in this analysis, the definitions are as follows:

• Metal mining (SIC code 10)	500 employees
• Coal mining (SIC code 12)	500 employees
• Electric services (SIC code 4911)	4 million megawatt hours
• Electric and other services (SIC code 4931)	$5.0 million in annual receipts
• Combination utilities (SIC code 4939)	$5.0 million in annual receipts
• Refuse systems (SIC code 4953)	$6.0 million in annual receipts
• Chemical and allied products (SIC code 5169)	100 employees
• Petroleum bulk stations & terminals (SIC code 5171)	100 employees
• Business services (SIC code 7389)	$5.0 million in annual receipts
• Manufacturing (SIC codes 20 - 39)	500 employees

The SBA small business size standards are expansive, classifying most businesses as "small." For example, the default SBA size standard for manufacturing industries is 500 employees. According to information compiled by the Bureau of the Census, 325,395 of 330,310 firms have fewer than 500 employees (SBA, 1995). Therefore, at least 98.5 percent of firms would be classified as small businesses according to the SBA definition. In fact, this percentage is actually higher, since for certain SIC codes within manufacturing, the SBA size standard is 750, 1,000, or 1,500 employees.

The RFA defines "small governmental jurisdictions" as governments of cities, counties, towns, school districts, or special districts with a population of less than 50,000 people. This analysis applies this definition of a small governmental jurisdiction in evaluating the impacts on publicly-owned establishments affected by this rulemaking (i.e., municipally-owned electric utilities).

[24] SBA's most recent revisions to its "size standards" can be found in the January 31, 1996 Federal Register (61 FR 3175). Several minor corrections were published subsequent to the January notice. The SBA Internet site contains the corrected standards. The Internet address is: http://www.sbaonline.sba.gov/gopher/Financial-Assistance/Size-Standards.

The RFA defines “small organizations” as any “not-for-profit enterprise which is independently owned and operated and is not dominant in its field.” No small organizations are expected to report on lead and lead compounds as a result of the proposed lead rule.

5.1.2 METHODOLOGY OVERVIEW

This analysis uses annual cost impact percentages to measure potential impacts on small entities. The cost impact percentage is defined as annual compliance costs as a percentage of annual revenues or sales. This approach is based on the premise that the cost impact percentage is an appropriate measure of a firm's ability to afford the costs attributable to a regulatory change. For purposes of determining small entity impacts, comparing annual compliance costs to annual revenues provides a reasonable indication of the magnitude of the regulatory burden relative to a commonly available and objective measure of a company's business volume. Where regulatory costs represent a very small fraction of a typical firm's revenue, the impacts of the regulation are likely to be minimal.

The cost impact percentages are calculated using both the first- and subsequent-year compliance costs. As explained in Chapter 4, annual compliance costs are composed of facility- and report-specific costs. Facility-specific costs such as compliance determination and rule familiarization do not vary with the number of reports filed. Report-specific costs such as Form R completion and recordkeeping vary according to the number of reports a facility files.

The general methodology followed to estimate the impacts on small entities consists of following steps:

(1) Obtain company-level annual revenue data;

(2) Develop company-level annual compliance cost estimates, based on the number of facilities per company and the number of reports per facility;

(3) Estimate the company-level impact percentages, defined as annual compliance costs as a percentage of annual revenues, as a measure of regulatory burden;

(4) Estimate the number of small companies affected (i.e., the number of small companies with at least one reporting facility);

(5) Estimate the percentage and number of small companies with company-level annual impact percentages in each of three categories: (1) less than one percent; (2) between one and three percent; and (3) greater than or equal to three percent.

The resolution of the analysis varies somewhat by industry group depending on the level of aggregation of compliance costs for each industry. Not all affected industry groups were analyzed at the 4-digit SIC code level. Specifically, the impacts on SIC codes 10 and 12 are examined at the two-digit level. SIC codes 20-39 are examined as a composite for all manufacturing. SIC codes 5169 and 5171 are examined at the four-digit level. For coal- and oil-fired electric services (SIC codes 4911, 4931, and 4939), RCRA subtitle C facilities (SIC code

4953), and solvent recovery services (SIC code 7389), the analysis examines the impacts on only the specific portions of the industry groups subject to TRI reporting. In the following sections, the analysis and results for each industry group are described. In addition, there is a section describing the analysis of the impacts on publicly-owned entities.

5.1.3 GENERATION OF COMPANY REVENUE DATA

This section describes how employment and revenue data were developed for companies in affected industries. For most industry groups, this analysis does not predict which specific companies have facilities that are expected to report on lead and lead compounds. Rather, the general approach is to construct industry group profiles that represent potential reporting companies. These profiles are then used to estimate the employment and revenues of the parent companies of potentially affected facilities and to estimate the percentage of parent companies classified as large or small.

For SIC codes 20-39 it is assumed that manufacturing facilities expected to file for lead and lead compounds, are similar to current reporters in terms of employment and revenues. Therefore, employment and revenue profiles are constructed for parent companies of current TRI reporters and are then used in this analysis to represent parent companies of facilities expected to report on lead and lead compounds. For all other SIC codes except 4911, 4953, and 7389, employment and revenue profiles were created using D&B data for every facility with more than 10 FTEs in the affected SIC codes, even though not all of the facilities are expected to report. It is assumed, however, that the facilities that do report have characteristics similar to the larger group. For 4911, 4953, and 7389, a more specific list of facilities based on other reporting criteria was used to identify facilities likely to report. Employment and revenue profiles were then created using D&B data for these facilities.

Company employment and revenue data were obtained for commercial facilities in the industry groups affected by the proposed rule from *Dun and Bradstreet's Market Identifiers On-Line Data Base* and *Dun's Marketing Services*, both services of Dun and Bradstreet (D&B). For over 11 million business locations, D&B provides data such as:

- Number of employees
- Line of business
- Key financial indicators
- Parent/headquarters

as well as many other variables. Employment and revenue data for commercial facilities in the manufacturing SIC codes (20-39) and in SIC code 7389 were obtained from a March 1998 version of *Dun's Marketing Services* available through EPA's Mainframe computer. Dun and Bradstreet data for August of 1995 were obtained for SIC codes 10, 12, 4911, 4931, 4939, 4953, 5169, and 5171 as part of the TRI industry expansion economic analysis. For manufacturers and solvent recyclers, revenue figures were obtained in 1998 dollars. For the remaining SIC codes, all revenue figures were either obtained in 1995 dollars or converted to 1995 dollars using the implicit price deflator for the U.S. Gross Domestic Product.

EPA accesses *Dun's Marketing Services* through the FINDS system located on the Agency's IBM mainframe computer. The FINDS system contains selected D&B variables and contains no financial data other than revenue figures. The D&B data base uses the Standard Industrial Classification (SIC) code system to categorize business establishments based on the type of activity undertaken at that location. The employment and revenue data used in this analysis represent data for ultimate parent companies that own one or more establishments with a *primary* SIC code matching one of the SIC codes covered under the proposed rule.[25,26] As mentioned above, for SIC codes 20-39 it is assumed that manufacturing facilities expected to file for lead and lead compounds are similar to current reporters in terms of employment and revenues. Therefore, current TRI reporters were identified in D&B. Employment and revenue data was obtained for the ultimate parent companies linked to these facilities. For SIC codes 10, 12, 4931, 4939, 5169 and 5171, the analysis identified all establishments listed in D&B with a matching SIC code, based on the establishment's primary SIC code classification, and obtained employment and revenue information for the establishment's ultimate parent company.[27] For SIC codes 4953 and 7389, the analysis identified the potential reporters in D&B and obtained employment and revenue information for the establishment's ultimate parent company.

Using the employment and revenue profiles, parent companies in each industry group were classified as small or large (based on SBA definitions). Annual revenue quartiles were determined for each size class and industry group. Information on the average number of facilities per parent company was also collected for the industry group as a whole and for small and large companies within the industry group.

For most industry groups it was not possible to identify the specific facilities expected to report. In the case of coal- and oil-fired electric power generating facilities in SIC code 4911, information was available for a specific list of facilities expected to report. From the list of facilities expected to report, the analysis obtained the number of employees and annual revenue for the ultimate parent company associated with each individual establishment. For SIC code

---

[25] A facility with multiple SIC codes is subject to TRI if the largest share of its revenue is from a covered SIC code, or if the total value of revenues derived from covered SIC codes represents a majority of the facility's revenues. It is not possible to determine whether a facility would be subject to reporting based on the Dun & Bradstreet SIC code listing alone. Dun's contains a primary SIC code and up to five additional (secondary) SIC codes; each SIC code represents a minimum of 10 percent of the location's revenue. For this analysis, it was assumed that the primary SIC code represents the largest share of a facility's operations, and thus a facility with a primary SIC code covered by the proposed rule was assumed to be subject to TRI reporting.

[26] The ultimate parent is the uppermost parent or headquarters that encompasses all directly related branches, subsidiaries or parents of a specific business. For the purposes of this analysis, establishments in Dun's were assumed to correspond to facilities in TRI.

[27] The employee and revenue data used for SIC code 12 (Coal mining) include all operations except those in SIC code 1241, while the facilities actually expected to report only includes facilities with coal preparation operations.

4911, it was not necessary to construct revenue quartiles, rather small entity impacts were estimated for the parent companies of coal and oil-fired electric utilities affected by the proposed lead rule.

The analysis accounts for parent companies owning more than one affected facility to obtain a list of unique ultimate parent companies. Consistent with the SBA size standards, the ultimate parent data obtained include available data on employees and revenues of all subsidiaries, divisions and branches of that parent, including those not individually affected under the proposed rule. The estimated number of facilities per ultimate parent, however, represents the number of facilities owned by that parent company that are classified in the affected SIC code or industry group (not the total number of facilities per parent company).

The information outlined in this section on company size, company revenues, and numbers of reporting facilities per company are used in the following sections to estimate small entity impacts.

5.1.4 ESTIMATING SMALL COMPANY IMPACTS

To evaluate the potential cumulative burden of the modified reporting requirements, annual compliance costs are estimated at the company level to be consistent with the financial data generated from D&B and other sources. For purposes of evaluating the impacts on small entities, an "affected" facility is defined as a facility that will submit at least one report as a result of the proposed rule. Thus, an "affected" company under this analysis is defined as a company owning at least one "affected" facility.[28] In the next section, the impacts to industry groups for which revenue quartiles were generated are estimated. Impacts to SIC code 4911 are estimated in the subsequent section.

SIC codes 10, 12, 20-39, 4931, 4939, 4953, 5169, 5171, and 7389

The analysis of small entity impacts for these SIC codes uses (1) a range of reports per facility,[29] (2) the average number of facilities per company for small companies, and (3) the annual revenue for the 25th, 50th, and 75th percentage quartile for small companies. For SIC codes 10, 12, 20-39, 4931, 4939, 5169, and 5171, the revenue data and average number of locations per small company were estimated from the analysis of the Dun and Bradstreet data, as described in Section 5.1.4. For SIC code 4953, the revenue and average number of facilities per

[28] This analysis assumes that a facility, as defined under TRI, is equivalent to a location as defined by D&B. A "facility," subject to EPCRA section 313 reporting requirements, means all buildings, equipment, structures, and other stationary items which are located on a single site or on contiguous or adjacent sites, and which are owned or operated by the same person, that is classified under an SIC code covered by the regulations, has 10 or more employees or the equivalent, and manufactures, processes, or otherwise uses any of the listed toxic chemicals or chemical categories above the specific reporting thresholds. For some industries this may not correspond exactly to the definition of a location by D&B.

[29] Since this proposal deals with a single parent metal and its compounds, each facility could file, at most, one additional report.

parent company were obtained from D&B for a subset of facilities expected to report to TRI.[30] For SIC code 7389, the revenue and average number of facilities per parent company were estimated from 1998 D&B data obtained for 52 solvent recovery facilities identified in *EI Digest*.[31] Chapter 3 and Appendix A describe how the number of reports per industry group was estimated.

Parent company compliance cost estimates were developed by multiplying the unit cost of compliance by one report per facility and by the average number of facilties per parent company. Table 5-1 presents the first-year and subsequent-year company-level cost impact percentages for the 25th, 50th, and 75th percent quartiles for small and large companies in SIC codes 10, 12, 20 - 39, 4931, 4939, 4953, 5169, 5171, and 7389 under the preferred option (Option 2).

Estimating the Number of Small Companies Affected

To estimate the number of small companies affected, EPA used the following approach:

Step 1: Estimate the total number of companies (all sizes) affected by dividing the estimated number of affected facilities in each industry by the average number of facilities per parent for the industry as a whole. The average number of facilities per parent for SIC codes 10, 12, 20-39, 4931, 4939, 4953, 5169, 5171, and 7389 was obtained from the analysis of the Dun and Bradstreet data base as described in Section 5.1.4. They are presented in Table 5-1.

Step 2: Divide the estimated number of companies (all sizes) into size categories (in this case, large and small as defined by SBA) using the distribution of large and small companies for each industry as indicated from the Dun and Bradstreet data described in Section 5.1.4.

Table 5- 2 presents the inputs and results of these calculations for each industry under the preferred option.

[30] The TRI Industry Expansion analysis identified 162 facilities in SIC code 4953 expected to report. Of the 162, 150 were matched to 76 unique ultimate parent companies. Of these 76 ultimate parents, the Duns data base included revenue data for 59 (six of which were small according to the SBA definitions), accounting for 127 facilities. Based on this data, the analysis estimated that the 162 facilities in the industry have 82 parent companies, of which 8 are small.

[31] As described in 5.1.3, this group of facilities (and associated parent companies) is expected to be representative of facilities that may report as a result of the proposed lead rule.

TABLE 5-1
COMPANY-LEVEL COST IMPACT PERCENTAGES
PREFERRED OPTION — FIRST YEAR RANGE OF POTENTIAL IMPACTS

SIC Code		Avg. # of Facilities per Company	First Year Total Costs	25% Quartile Cost/Rev Ratio	Median Cost/Rev Ratio	75% Quartile Cost/Rev Ratio
10	large	2.5	$1,621	0.0%	0.0%	0.0%
	small	1.2	$140	0.1%	0.0%	0.0%
12	large	3.6	$20,600	0.0%	0.0%	0.0%
	small	1.1	$6,237	0.4%	0.2%	0.1%
4931	large	3.1	$17,854	0.1%	0.0%	0.0%
	small	1.0	$5,722	0.3%	0.2%	0.1%
4939	large	1.8	$10,014	0.1%	0.0%	0.0%
	small	1.0	$5,722	0.4%	0.3%	0.2%
4953	large	2.3	$12,932	0.0%	0.0%	0.0%
	small	1.2	$6,695	0.2%	0.2%	0.1%
5169	large	3.7	$2,355	0.0%	0.0%	0.0%
	small	1.6	$676	0.0%	0.0%	0.0%
5171	large	1.9	$11,101	0.0%	0.0%	0.0%
	small	1.0	$5,894	0.1%	0.1%	0.0%
7389	large	1.2	$6,867	0.1%	0.0%	0.0%
	small	1.1	$6,295	0.5%	0.3%	0.2%
20-39	large	3.7	$24,452	0.0%	0.0%	0.0%
	small	1.1	$7,416	0.2%	0.1%	0.0%

Note: Although SIC Codes 10 and 5169 do not file any reports, they incur compliance determination costs.

TABLE 5 - 1
COMPANY-LEVEL COST IMPACT PERCENTAGES
PREFERRED OPTION — SUBSEQUENT YEAR RANGE OF POTENTIAL IMPACTS

SIC Code		Avg. # of Facilities per Company	Subsequent Year Total Costs	25% Quartile Cost/Rev Ratio	Median Cost/Rev Ratio	75% Quartile Cost/Rev Ratio
10	large	2.5	$405	0.0%	0.0%	0.0%
	small	1.2	$185	0.0%	0.0%	0.0%
12	large	3.6	$13,383	0.0%	0.0%	0.0%
	small	1.1	$4,052	0.3%	0.2%	0.1%
4931	large	3.1	$11,599	0.0%	0.0%	0.0%
	small	1.0	$3,717	0.2%	0.1%	0.1%
4939	large	1.8	$6,506	0.1%	0.0%	0.0%
	small	1.0	$3,717	0.2%	0.2%	0.1%
4953	large	2.3	$8,402	0.0%	0.0%	0.0%
	small	1.2	$4,349	0.1%	0.1%	0.1%
5169	large	3.7	$589	0.0%	0.0%	0.0%
	small	1.6	$169	0.0%	0.0%	0.0%
5171	large	1.9	$7,212	0.0%	0.0%	0.0%
	small	1.0	$3,829	0.1%	0.1%	0.0%
7389	large	1.2	$4,461	0.0%	0.0%	0.0%
	small	1.1	$4,089	0.3%	0.2%	0.1%
20-39	large	3.7	$13,625	0.0%	0.0%	0.0%
	small	1.1	$4,132	0.1%	0.0%	0.0%

Note: Although SIC Codes 10 and 5169 do not file any reports, they incur compliance determination costs.

TABLE 5-2
ESTIMATED NUMBER OF AFFECTED SMALL ENTITIES
PREFERRED OPTION

SIC Code	Estimated Number of Affected Facilities	Average Number of Facilities Per Parent	Estimated Number of Parent Entities	Estimated Percentage of Small Entities	Estimated Number of Small Entities
Industry					
10	0	1.9	0	60%	0
12	321	1.4	226	87%	197
4911	191	2.0	94	18%	17
4931	135	2.7	50	8%	4
4939	16	1.3	12	26%	3
4953	74	2.2	34	10%	4
5169	0	1.6	0	81%	0
5171	980	1.2	831	84%	698
7389	24	1.2	20	32%	6
20-39	13,266	1.9	6,874	68%	4,673
Municipal Utilities	36	1.1	34	46%	18
TOTAL	15,043	1.8	8,175	69%	5,620

Note: Due to rounding, calculations may not yield exact numbers.

Estimating Small Company Impacts

The number of small companies with impacts of 1) less than one percent, 2) between one percent and three percent, or 3) greater than or equal to three percent is estimated using a distribution of reports per facility and a distribution of companies by revenue level.

Companies in each size class (large or small) were assumed to be evenly distributed between the first quartile (25%), middle quartile (50%), and third quartile (75%) of annual revenues for each industry group.[32] Assuming an even distribution of companies by revenue level implies that one-third of the companies are most like the 25th percent quartile company, one-third are most like the 50th percent, or median company, and one-third are most like the 75th

[32] The development of these quartiles was described in Section 5.1.3.

percent quartile company. In contrast, a normal distribution would imply that more companies (i.e., greater than one-third) are most like the median company than like the 25th or 75th percent quartile company. Assuming an even distribution increases the estimated percentage (and number) of companies with lower revenues, and thus, with higher cost impacts.

The magnitude of the impact of the proposed lead rule on a small company depends on (1) the number of facilities that a small company has and (2) the overall revenues of the small company. The methodology used to estimate the impact of the proposed lead rule on small companies is very straightforward due to the fact that each affected facility files only one report for lead and lead compounds. First, a per facility compliance cost is calculated which consists of both facility specific and report specific costs. Second, an industry specific parent company cost is calculated by multiplying the per facility cost by the average number of facilities per parent company in that industry group. Third, the parent company compliance cost is compared to first quartile, middle quartile, and third quartile annual revenues for each industry group. Table 5-3 presents the estimated number of small companies in each impact category.

TABLE 5-3
SUMMARY OF IMPACTS ON SMALL ENTITIES
FIRST YEAR
PREFERRED OPTION

SIC Code	Estimated Number of Affected Entities	Estimated Number of Affected Small Entities	Estimated Number of Small Entities with Impacts of 3 Percent or Greater	Estimated Number of Small Entities with Impacts Between 1 and 3 Percent	Estimated Number of Small Entities with Impacts Less than 1 Percent
10	0	0	0	0	0
12	226	197	0	0	197
4911	94	17	0	0	17
4931	50	4	0	0	4
4939	12	3	0	0	3
4953	34	4	0	0	4
5169	0	0	0	0	0
5171	831	698	0	0	698
7389	20	6	0	0	6
20-39	6,874	4,673	0	0	4,673
Municipal Utilities	34	18	0	0	18
TOTAL	8,175	5,620	0	0	5,620
Percentage of Small Entities	—	100%	0%	0%	100%

Note: Due to rounding, calculations may not yield exact numbers.

TABLE 5-3 (Continued)
SUMMARY OF IMPACTS ON SMALL ENTITIES
SUBSEQUENT YEARS
PREFERRED OPTION

SIC Code	Estimated Number of Affected Entities	Estimated Number of Affected Small Entities	Estimated Number of Small Entities with Impacts of 3 Percent or Greater	Estimated Number of Small Entities with Impacts Between 1 and 3 Percent	Estimated Number of Small Entities with Impacts Less than 1 Percent
10	0	0	0	0	0
12	226	197	0	0	197
4911	94	17	0	0	17
4931	50	4	0	0	4
4939	12	3	0	0	3
4953	34	4	0	0	4
5169	0	0	0	0	0
5171	831	698	0	0	698
7389	20	6	0	0	6
20-39	6,874	4,673	0	0	4,673
Municipal Utilities	34	18	0	0	18
TOTAL	8,175	5,620	0	0	5,620
Percentage of Small Entities	--	100%	0%	0%	100%

Note: Due to rounding, calculations may not yield exact numbers.

SIC Code 4911 (Coal- and Oil-Fired Steam Electric Services)

This industry group was analyzed separately because of the nature of the SBA definition of a small business for this industry and because it was possible to identify the actual facilities expected to report under the modified reporting requirements. The SBA definition of a small business for this SIC code is four million megawatt hours (MWh) of electricity output annually. The analysis of this industry is based on a database of steam-generating power plants available from the Utility Data Institute (UDI).

To match the SBA size definition, which applies to the parent company and all subsidiaries, divisions and branches, it was necessary to aggregate the coal- and oil-fired power plants listed in the UDI database based on common ownership. Determining common ownership of these power generating facilities was accomplished by matching facilities listed in the UDI database with information in *Dun & Bradstreet's Market Identifiers On-line Database*, which provides a unique Dun's number for each location listed in the database and also indicates whether the location is a subsidiary, division or branch, or has a separate headquarters and/or immediate and ultimate parent. Some facilities in the UDI data base had no immediate or ultimate parent listed in the Dun & Bradstreet database. For these facilities, the owner listed in the UDI database was assumed to be the ultimate parent. By this method, all facilities sharing common ownership were aggregated under a single listing for the ultimate parent to the extent indicated by the data sources used. The 465 privately-owned electric utility facilities were associated with 113 parent companies. Under the proposed lead rule, 191 of the 465 facilities are expected to file. The 191 facilities were associated with 94 parent companies for which revenue data were available, indicating an average of 2.03 locations per parent company.

Financial and employee size data for each parent company were obtained from *Dun & Bradstreet's Market Identifiers On-line Database*. For those companies for whom annual revenues could not be obtained at the parent level from Dun and Bradstreet, revenue information was obtained from other data sources, including *Ward's Business Directory of U.S. Private and Public Companies, 1996 Directory of Corporate Affiliations*, and *Electrical World Directory of Electric Power Producers*, 104th edition.

The records were then sorted by annual production to determine the number of large and small companies based on the 4-million MWh SBA standard. For each parent company listing, the total estimated compliance burden was calculated based on the number of subsidiary facilities affected under the proposed lead rule.[33]

The annual cost impact percentage (annual compliance costs as a percentage of annual revenues) was then estimated for each company as previously described. The cost impact

[33] The UDI data base includes only steam-electric generating facilities. Consequently, some parent companies listed may have additional non-steam generating capacity (e.g., hydro, wind) which should be included in their total annual production for purposes of determining if the company exceeds the SBA's 4-million MWh standard. This potential source of error would be expected to overcount the number of "small" companies in SIC code 4911.

percentages for each ultimate parent were classified into one of three categories as a measure of the potential regulatory burden: (1) less than one percent of annual revenues; (2) from one to three percent of annual revenues; and (3) three percent or more of annual revenues. Table 5-4 presents the results of this analysis for the Preferred Option.

Publicly-Owned Facilities

This analysis examines the potential impacts on small municipalities that own one or more coal- and/or oil-fired electric utilities. Electric utilities are the only publicly-owned facilities expected to be affected under the proposed lead rule. A total of 49 municipally-owned electric utility facilities representing 39 unique municipally-owned parent entities were identified from the UDI data (USEPA, 1997). Under the proposed lead rule, 36 of the 49 municipal utilities are expected to report. These 36 municipal utilities are associated with 34 parent entities. The RFA defines a small governmental jurisdiction as having a population of less than 50,000 people. Population data for each municipality were obtained from *Electric World Directory of Electric Power Producers*, 104th edition, and from the *County and City Data Book: 1994*. Based on these population data, 18 small municipally-owned electric utility companies were identified, representing 21 individual facilities.

The compliance cost for each electric utility was then estimated and compared against the utility's annual revenues. Annual revenue data were obtained from *Electrical World Directory of Electric Power Producers*, 104th edition. Revenue information was provided directly by four utilities for which published data were not available.[34]

Table 5-5 summarizes the results for small municipally-owned electric utilities.

[34] Utility revenues were examined, in place of annual governmental revenues, because revenue data were not available for several municipalities. Using utility revenue to examine the potential regulatory burden on these entities is expected to provide a more conservative estimate of the potential impacts on these small entities because the utility revenues represent only a portion of the total annual revenues for a municipality. Thus, it can be assumed that the cost impact percentage based on total annual municipal revenues will be lower than estimated when comparing utility compliance costs to utility revenues alone.

TABLE 5-4
ESTIMATED IMPACTS ON COAL- AND OIL-FIRED ELECTRIC SERVICES
SIC CODE 4911
PREFERRED OPTION

Size Classification	Number of Companies	Median Annual Sales (Millions)	Companies with Impacts of 3% of Annual Sales	Companies with Impacts of 1%-3% of Annual Sales	Companies with Impacts < 1% of Annual Sales
FIRST YEAR					
Large (> 4 Million MWh)	77	$1,367	0	0	77
Small (< 4 Million MWh)	17	$181	0	0	17
Total	94				94
SUBSEQUENT YEARS					
Large (> 4 Million MWh)	77	$1,367	0	0	77
Small (< 4 Million MWh)	17	$181	0	0	17
Total	94				94

TABLE 5-5
ESTIMATED IMPACTS FOR MUNICIPALLY-OWNED ELECTRIC UTILITIES
SIC CODE 4911
PREFERRED OPTION

Size Classification	Number of Municipalities	Median Annual Sales[1] (Millions)	Municipalities with Impacts 3% of Annual Sales	Municipalities with Impacts of 1%-3% of Annual Sales	Municipalities with Impacts < 1% of Annual Sales
FIRST YEAR					
Small Municipalities (Pop. < 50,000)	18	$16.8	0	0	18
SUBSEQUENT YEARS					
Small Municipalities (Pop. < 50,000)	18	$16.8	0	0	18

[1] Median annual sales data is based on utility revenues, not total revenues for the municipalities owning the utilities.

5.1.5 SUMMARY OF SMALL ENTITY IMPACTS

This section summarizes the estimated impacts for all small entities based on the results of the industry-specific analyses discussed in previous sections. Table 5-2 presents the estimated number of affected small companies within each industry group and number of affected small municipalities. Table 5-3 presents the estimated number of small companies and small municipalities falling into each impact category as well as the overall results for all companies and municipalities affected by the proposed lead rule. As Table 5-3 illustrates, the proposed lead rule is estimated to affect 5,620 small companies and municipalities. Of these small entities, 100% are expected to have impacts of less than one percent in the first year. None of the small entities will experience impacts of greater than one percent. In subsequent years, 100% of small entities may experience impacts below one percent. None of the small entities will experience impacts of greater than one percent.

5.2 POTENTIAL OVERLAP IN ESTIMATED IMPACTS OF THE PROPOSED LEAD RULE AND THE PROPOSED PBT RULE

As described in Chapters 3 and 4, EPA has recently proposed to modify current reporting requirements for certain PBT chemicals (64 FR 688). Because the PBT proposal is not yet final, the reports associated with the proposed PBT rule are not considered as part of current (or "baseline") reporting. Therefore, as noted in Chapter 3, the number of first time filers under the proposed lead rule will also include a portion of the first time filers identified in the economic analysis of the proposed PBT rule (1,773 facilities). These overlapping facilities, and their associated costs ($4.4 million in the first year only), are included in the estimation of small entity impacts outlined in the sections above, as well as in the small entity impact analysis for the PBT rule.

5.3 IMPACTS ON CERTAIN DEMOGRAPHIC GROUPS

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that all federal agencies address the issue of environmental justice by identifying and revising programs, policies, and activities that may disproportionately and adversely affect the health of minority or low income populations or their environments. Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks," requires that for rules that are economically significant under Executive Order 12866, federal agencies must, to the extent permitted by law and consistent with the agency's mission, identify and assess the environmental health risks and safety risks that may disproportionately affect children.

By lowering the section 313 reporting thresholds for lead and lead compounds, EPA is providing communities across the United States (including low-income populations and minority populations) with access to data that may assist them in lowering exposures and consequently reducing chemical risks for themselves and their children. This information can also be used by government agencies and others to identify potential problems, set priorities, and take appropriate

steps to reduce any potential risks to human health and the environment. Specific activities, such as information dissemination, exposure mitigation, pollution prevention, outreach and educational programs, and consumer protection programs, can be expected to benefit minority and economically disadvantaged groups even if the programs are not specifically targeting at these groups. The collection of this data will also assist in determining and responding to environmental health and safety risks to children. Therefore, the informational benefits of the proposed lead rule will have a positive effect on the human health and environment of minority populations, low-income populations, and children.

LITERATURE CITED

1996 Directory of Corporate Affiliations (1996), volumes 1-5, New Providence: National Register Publishing, 1996.

"Directory of U.S. and Canadian Commercial Hazardous Waste Management Facilities," (1995), The Hazardous Waste Consultant. Elsevier Science Inc. March-April, 1995.

Dun & Bradstreet. Dun & Bradstreet's Market Identifiers On-line Data Base.

Dun & Bradstreet. Dun's Marketing Services Data Base. August, 1995.

Dun & Bradstreet. Dun's Marketing Services Data Base. March, 1998.

Electrical World Directory of Electric Power Producers (1995), 104th ed. New York: The McGraw-Hill Companies, 1995.

U.S. Department of Commerce, Bureau of the Census. County and City Data Book (1994). Washington, D.C.: Government Printing Office, 1994.

U.S. EPA. Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting. April, 1997.

U.S. Small Business Administration 1998. Information from the Small Business Administration on the SBA World Wide Web site: http:\\www.sba.gov\advo\stats\us_ind95.html

Utility Data Institute. 1994 Production Costs: Operating Steam-Electric Plants (UDI-2011-95)(1995), 14th ed. September 1995.

Ward's Business Directory of U.S. Private and Public Companies, volumes 1-4 (1996). New York: Gale Research, Inc., 1996.

CHAPTER 6
BENEFITS

6.1 INTRODUCTION

In enacting the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 and the Pollution Prevention Act (PPA) of 1990, Congress recognized the significant benefits of providing information on the presence, releases and waste management of toxic chemicals. The Toxics Release Inventory (TRI) has proven to be one of the most powerful forces in empowering the federal government, state and local governments, industry, environmental groups and the general public to fully participate in an informed dialogue about the environmental impacts of toxic chemicals in the United States. TRI's publicly available data base provides quantitative information on toxic chemical releases and other waste management activities. With the collection of this information starting in 1987 came the ability for the public, government, and the regulated community to understand the magnitude of chemical releases in the United States, and to assess the need to reduce the releases and transfers of toxic chemicals. TRI enables all interested parties to establish credible baselines, to set realistic goals for environmental progress, and to measure progress in meeting these goals over time. As such, the TRI system has become a neutral yardstick by which progress can be measured by all stakeholders.

In this chapter, the benefits of expanding TRI reporting on lead and lead compounds under EPCRA Section 313 are discussed. Section 6.2 discusses the potential benefits of TRI reporting. Section 6.3 discusses the additional information on lead and lead compounds that may be collected under the proposed rule.

6.2 POTENTIAL BENEFITS OF TRI REPORTING

The information reported to TRI increases knowledge of the levels of toxic chemicals released to the environment and the potential pathways of exposure, improving scientific understanding of the health and environmental risks of toxic chemicals; allows the public to make informed decisions on where to work and live; enhances the ability of corporate leaders and purchasers to more accurately gauge a facility's potential environmental liabilities; provides reporting facilities with information that can be used to save money as well as reduce emissions; and assists federal, state, and local authorities in making better decisions on acceptable levels of toxics in the environment. The benefits of the proposed rule include improvements in understanding, awareness, and decision making related to the provision and distribution of information on releases and waste management of lead and lead compounds.

The provision of information can lead to follow-on activities that create additional costs and benefits (see Table 6-1). As evidenced by the current TRI reporting, this information can lead to voluntary initiatives by industry to review production processes, set goals for reductions

in emissions, and institute "good neighbor" policies. If an individual facility owner or operator perceives that the benefits outweigh costs, then he or she will implement changes to reduce releases of TRI chemicals.[35] Even when firms do not find it initially in their own interest to reduce releases, making TRI information available to the public may induce changes in the marketplace that provide incentives for firms to cut TRI chemical releases.

Social benefits derived from follow-on activities not required by the proposed rule may include decreased costs of waste treatment and disposal, lower probability of accidental releases and lower clean-up costs in the event of such releases, reduced contamination of natural resources from decreased land disposal, improved air and water quality, and reduced risks to human health such as lower incidence of elevated blood lead levels and related medical costs. Such social benefits are offset by the social costs to implement the changes, such as installing scrubbers and substituting materials that are less toxic but more expensive. The net social benefits of the information provided by the proposed rule and the follow-on activities equal the difference between the benefits and the costs displayed in Table 6-1.

6.2.1 THEORETICAL BASIS FOR ASSESSMENT OF PBT INFORMATION BENEFITS

Pollution resulting from releases of lead and lead compounds to the environment suggests two distinct types of market failure: negative externalities and asymmetric information. As a consequence, economic theory suggests that the social benefits of having access to information on lead and lead compounds in order to address these market failures may be large.

This section develops a framework for discussing economic benefits of information resulting from the proposed rule. As in past regulations implementing EPCRA section 313, the objective of the proposed rule is to correct market failures, which inhibit the ability of the traditional economic pricing system to maximize social welfare.[36] Pollutants must either be physically altered and/or diluted in the environment so as not to cause health or environmental damages. Persistence and bioaccumulation in the environment requires that the benefits analysis appropriately address time and the diverse group of resource users and uses that are potentially affected. The following economic framework specifically accounts for the persistent and bioaccumulative nature of lead and lead compounds.

[35] Companies that participated in EPA's 33/50 program fall into this category.

[36] It is a well established theory in modern economics that markets will fail to achieve socially optimal outcomes when differences exist between market and social values.

TABLE 6-1
POTENTIAL BENEFITS AND COSTS ASSOCIATED WITH THE PROPOSED RULE AND WITH FOLLOW-ON ACTIVITIES

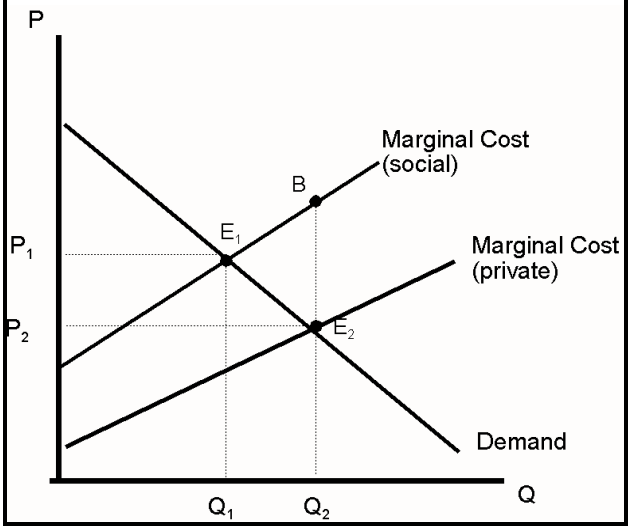
Consequences of Activities Required by the Proposed Rule		
Activity	**Activity**	**Benefits**
Companies file Form R	Government publishes TRI information, thus providing additional information on chemical releases to the public	Improved scientific understanding of environmental and health risks Increased public awareness More informed decision-making by government, industry and the public
[Industry cost]	[Government cost]	[Societal benefit]
Follow-On Activities (i.e., not required by the proposed rule)		
Activity	**Activity**	**Benefits**
Industry-initiated review of processes, goal-setting for reductions, institution of "good neighbor" policies, etc.	Implementation of changes in production, operation, and raw materials use by industry yield reductions in releases, treatment and disposal of waste	Reduced waste disposal costs for industry Reduced clean-up costs arising from accidental releases Reduced third-party liability risk (thus, decreased risk management costs to industry) Reduced environmental and human health risks Improved preservation of natural resources
[Industry cost]	[Industry cost]	[Societal benefit]

Lead and Lead Compounds as Negative Externalities

Negative externalities exist when a production process imposes uncompensated (or "external") costs on another party. During manufacturing and other business activities, facilities may release pollutants or cause other environmental harm without accounting for the consequences of these actions. These costs may not be recognized by the responsible entity in the conventional market-based accounting framework. For example, a firm that produces and/or uses hazardous chemicals will pay for labor and capital but will not pay for environmental damages resulting from the emission of these hazardous chemicals. Because these costs are not recognized by the responsible entity, they are not considered in the consequent production and pricing decisions of the firm. To the extent that negative externalities are present, an overproduction and overuse of environmentally hazardous chemicals will occur and an inefficient level of environmental quality will result (Mills and Graves, 1986).

Figure 6-1 illustrates market failure in the case of external production costs. In the diagram, the marginal private cost curve is the firm's supply function. The demand curve represents society's willingness to pay. The private marginal cost curve differs from the social marginal cost curve by the dollar value of pollution damages (private costs + external costs). The intersection of marginal social cost and demand gives the socially optimal price (P_1) and quantity (Q_1). However, when pollution costs are not addressed, the equilibrium price is P_2 and the equilibrium quantity is Q_2. For each unit consumed beyond Q_1, the distance between the marginal social cost curve and the marginal private cost curve represents the cost to society imposed by the externality. Society is compensated for a portion of these costs, because consumers willingness to pay exceeds marginal private costs. The remainder, area E_1E_2B is referred to as the deadweight loss. This is a cost in the sense that with external costs present, a lower-value combination of goods and environmental quality is produced than would otherwise be achieved.

FIGURE 6-1
SOURCES OF MARKET FAILURE



TRI information from the proposed rule may facilitate constructive activities that internalize the negative externality by bringing the marginal social cost curve and the marginal private cost curves closer together. This outcome may be achieved by either reducing the marginal social cost associated with production of the good Q, and/or by increasing the marginal private cost. Marginal private costs may be increased, for example, by a firm's expenditures on pollution control. Marginal social costs may be decreased by changes in the production process, for example, by substituting less toxic alternative inputs for lead and lead compounds.

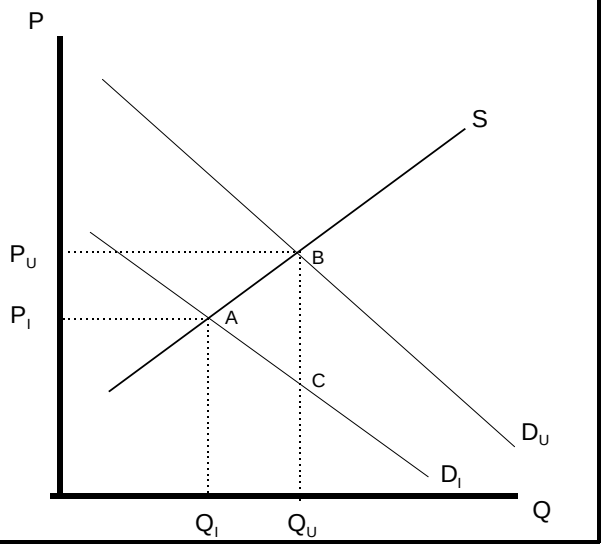
The paradigm of negative externalities assumes that consumers are informed about the health and environmental effects of contaminants. However, it may be impossible to link specific health and environmental effects with particular point-source dischargers. Under circumstances when markets do not provide such information, the TRI provides valuable data that may facilitate a market-based solution as described above.[37] The next section addresses market failure when the consumer informational assumption is not met.

Lead and Lead Compounds as an Asymmetric Information Problem

In economic theory, consumers and producers require complete information about all associated benefits and costs for resources to be efficiently allocated. Specifically, because of the persistent and bioaccumulative nature of lead and lead compounds, consumers may not have sufficient information regarding the health and environmental consequences of their purchasing decisions, and may or may not be aware of the limitations of the information they do have. This lack of information leads to inefficient market outcomes, a misallocation of resources, and diminished societal well-being.

Producers have a strong incentive to inform consumers of the positive aspects of their products in order to increase demand, but they do not ordinarily have an incentive to furnish consumers with information regarding the negative consequences associated with their products' use or production, such as the release of toxic chemicals to the environment. Lacking full information of the consequences of their purchases, consumers may over-value or

FIGURE 6-2
INFORMATION PROVISION AND EFFICIENCY



[37] Economists have argued that it is theoretically possible for the firm to negotiate with members of the community about payments to compensate them for the damages they suffer, yielding an efficient distribution of resources even in the presence of externalities (Davis and Hulett, 1977). In his article *The Problem of Social Cost*, R. H. Coase suggests that public intervention is not necessary to correct market imperfections because the affected party may be able to pay the producer of the externality to reduce their activities which result in external costs or to implement pollution controls. Theoretically, the affected party would be willing to offer a "bribe" for incremental pollution reductions up to the point where marginal abatement costs and marginal damages are equal. Both parties would be better off up to this point because the incremental payments made by the affected party will not exceed their marginal damages (the affected party benefits) and the payments received by the firm will exceed their marginal costs of pollution abatement (the polluter benefits). A *socially* efficient level of production is achieved (the equity implications of this solution are not factored into this outcome). For the proper operation of the Coase Theorem, several conditions (which are generally unmet in cases of environmental pollution) must be present: 1) property rights must be well defined, enforceable, and transferable; and 2) transaction costs must be minimal in order to allow negotiation to occur (Field, 1994).

under-value the goods in question. Generally, when consumers lack information regarding the negative consequences of their purchases, the result will be a misallocation of resources due to excess demand. The social cost or deadweight loss from *asymmetric information* is illustrated in Figure 6-2. In Figure 6-2, D_u represents the demand curve for Q when consumers are not fully informed. Similarly, D_i represents the demand curve for Q when consumers have all information relevant for purchasing decisions. The intersection between the market supply curve, S, and D_u and D_i determines the equilibrium price and quantities under each market setting, respectively. The equilibrium when consumers are uninformed is (P_u,Q_u), while the equilibrium for informed consumers is (P_i,Q_i). Uninformed consumers purchase greater amounts of Q at a higher equilibrium price as compared to informed consumers. As (P_i,Q_i) is the result that prevails in a properly operating market, the area ABC in Figure 6-2 is equal to the social cost.[38] Though this general description of the impact of consumers' lack of information is instructive, to properly assess the social benefits of the proposed rule, a further refinement in the characterization of the type of good being considered is required.

The type of good has a significant impact on the magnitude of the increase in efficiency resulting from government intervention to eliminate the information asymmetry. In an extension of Nelson (1970), Vining and Weimer (1988) and Boardman et al. (1996) describe three types of goods consumers may purchase. These goods are defined as 1) search goods—goods for which consumers can determine all relevant attributes before consumption; 2) experience goods—goods for which consumers can determine all relevant attributes only after consumption; and 3) post experience goods—goods for which consumers cannot determine all relevant characteristics immediately after consumption and may not become aware of all of these attributes for an indefinite period of time.

Asymmetric information characterizes the market for experience and post-experience goods.[39] For example, product repair frequency data for durable goods such as automobiles and large appliances constitute informational needs of consumers that may not reliably be met through primary market sources. Alternatively, consumers can accumulate information from secondary sources such as certification services, agents and subscription services.[40] Nelson (1970) defines the use of secondary sources of information as "guided sampling" and provides

---

[38] In addition to imposing a less than economically efficient outcome on society, asymmetric information causes a redistribution of social welfare from consumers to producers. Under the assumption that uninformed consumers over estimate the quality of Q, Figure 6-2 illustrates this redistribution is equal to the area P_uP_i,A,B. While the transfer of social welfare does not reduce aggregate economic benefits, measuring such transfers may be useful for addressing other important values such as equity and distribution.

[39] Search goods are associated with a low probability of information asymmetry and represent markets where consumers are actively seeking to make purchases. To the extent that heterogeneity in quality is present, or the frequency of purchase is low, asymmetric information may exist. However, the potential for information asymmetry is expected to be minimal as producers have strong incentives to provide information (e.g. advertising) that mitigates voids in consumer knowledge.

[40] Vining and Weimer (1988) provide examples of certification services including professional associations and the Better Business Bureau. Subscription services include *Consumer Reports* as well as other similar publications. In addition, consumers may make inquiries with friends or relatives.

statistical evidence that markets for secondary sources of information can function to provide relevant information for experience goods. These results suggest that government intervention in the market for experience goods is not generally required.

Unlike experience goods, the characteristics of post-experience goods remain unknown to the consumer indefinitely. In terms of Figure 6-2, this implies that deadweight losses, equal to the area ABC, occurs in every subsequent time period. In this situation a significant level of social costs will accrue.[41]

Vining and Weimer (1988) and Boardman et al. (1996) explain that markets for secondary sources of information related to post-experience goods fail to function effectively for several reasons. First, secondary sources may be unable to familiarize themselves with the characteristics of post-experience goods. Further, even though secondary sources may be able to collect relevant information, this process is likely to be very expensive.[42] Lastly, information has the characteristics of a "public good:" it is non-rival and non-excludable (depending on how it is made available). That is, once the information is gathered, one person's use of the information does not preclude another's use of the same information, and it is difficult to prevent uncontrolled distribution. Economic theory demonstrates that, absent some kind of collective action, the private market will fail to supply an economically efficient quantity of a public good (see the example in the box to the right). Vining and Weimer (1988) conclude that "...the strongest a priori rationale for public intervention on the grounds of information asymmetry arises in markets for post-experience goods (page 103)."

Efficient Provision of a Good

In economic theory, production and consumption of a good is "efficient" only if the cost of supplying the good is less than the value placed on the good by consumers (that value is often measured by the amount that people are "willing-to-pay" (WTP) for the good). For example, if it costs $10 to produce a hammer, and person A is WTP $5 for a hammer while person B is WTP $15 for the hammer, then the efficient production level is one hammer (purchased by B). Likewise, if B were only WTP $8 for the hammer, then no hammers would be consumed in an efficient market. In both cases, the free operation of a market should provide the efficient outcome (i.e., only B purchases a hammer in the first case; nobody purchases a hammer in the second case).

With public goods, however, free markets don't lead to efficient results. Consider the case of a unit of information, which costs $10 to provide. Person A is WTP $5 for the information; person B is WTP $8 for the information. Because neither person is WTP $10 for the information, it will not be provided. Since, however, A's use of the information does not preclude B's use of the information, the value of that unit of information to society as a whole is the sum of the individual values; i.e., $13. Since society as a whole is WTP more than the production cost of the information, then it is economically efficient to produce it. In the case of public goods such as information, efficient allocation is possible only with some sort of collective action (such as persons A and B cooperating to purchase the information).

[41] Of course to accurately assess the total value of the deadweight losses over time, it is necessary to discount the value of these costs appropriately for all time periods beyond the initial period.

[42] This may especially true if negative attributes are of concern, as producers have little incentive to reveal this information.

Boardman et al. (1996) provides examples of potential post-experience goods, including adverse health effects from a prescription drug or employees exposure to toxic chemicals. However, exposure to toxic chemicals is not limited to employees, but includes society as a whole. The persistent and bioaccumulative nature of lead and lead compounds places these chemicals in the category of post-experience goods. As discussed above, lead and lead compounds may have large-scale health and environmental effects that are likely to remain unrecognized by relevant parties for an indefinite period of time. Because lead and lead compounds are post-experience goods, the social costs that their health and environmental effects impose on society will accrue over time without appropriate information. For a number of reasons outlined above, secondary sources of information on lead and lead compounds are unlikely to function effectively. Extensive use of the existing TRI demonstrates the important role that government plays in providing information on toxic chemical releases. The persistent and bioaccumulative nature of lead and lead compounds and their appropriate characterization as post-experience goods suggests potentially significant social benefits from correcting market failure through the proposed rule.

Information: an Approach to Correcting Market Failure

The discussion presented above demonstrates that there is a strong likelihood that significant market failures exist for lead and lead compounds requiring government intervention. In the event of a significant market failure, public intervention is often required to achieve a more socially efficient outcome. Several alternative approaches are available to address market failure and to move society closer to an efficient allocation of resources: command-and-control (C&C) strategies, incentive-based strategies, and information-based strategies. C&C strategies tend to be less sensitive to differences in costs and benefits by setting standards for the quantities of pollutants a source may release. This approach is typically implemented by mandating specific control technologies (design standards) or specific environmental targets (performance standards). C&C strategies have been widely criticized on several grounds. By imposing a uniform standard across all facilities without consideration of the relative costs of emissions control, the standards approach forgoes possible savings that could be achieved by reallocating emissions reductions among firms in such a way as to achieve the same overall reductions but at a lower cost.

In addition to their efficiency shortcomings, C&C strategies will sometimes discourage technological innovation or create a weaker incentive for innovation than the incentive-based approaches discussed below. In the case of a technology based standard, firms will tend to adopt the technology represented by the standard regardless of whether a better (i.e., less expensive or more effective) alternative exists in order to insure compliance. Also, in the case of a technology based standard, no incentive exists for research and development (R&D). When faced with a performance standard, the incentive for engaging in R&D equals any avoided compliance costs; however, this is a weaker incentive than is created by the incentive-based approach (Field, 1994). Thus far, the discussion has focused on the inefficiency of a uniform standard in achieving a specific emission level. This is a question of cost-effectiveness—does the regulatory approach achieve a given emission level at least cost? In order to insure an efficient allocation of resources, however, emissions must not only be reduced at least cost but must also be reduced to

a socially efficient level. Information such as total releases, marginal abatement costs, and human and environmental damages are required to estimate an efficient level of emissions.

Both the incentive-based approach and information-based strategies have advantages compared to the standards approach. Incentive-based strategies, rather than mandating a uniform standard across all generators, place a price on every unit of pollution creating an incentive for emitters to reduce their emissions. The most common approach is to set a charge per unit of pollution; however, other alternatives are also suggested in the literature, including tradeable discharge permits and abatement subsidies (Field, 1994). Incentive-based strategies may be able to reduce the same quantity of emissions at a lower cost compared to C&C strategies because an incentive is created for reductions to occur where it is least costly to do so. However, as with the standards approach, the regulating agency requires data in order to estimate the shapes of the aggregate marginal cost curve and the aggregate marginal benefit curve.

It is clear from the discussion above that information such as that produced by the proposed rule plays a integral role in C&C strategies and incentive-based approaches to environmental management and policy. However, information itself can function as a market-oriented strategy for improving environmental quality. As in the case of incentive-based strategies, information-based strategies provide a more market-oriented alternative to C&C approaches. Specifically, they can lead to more cost-effective reductions in chemical emissions by allowing facilities the flexibility to decide whether and how to make reductions. Information-based approaches are quite varied: government testing and rating systems, mandatory disclosure requirements such as labeling and periodic reporting, and government provision of information. Consumers may respond to the additional information by changing their purchasing decisions (increasing or decreasing their consumption), by changing the way they use a product, or by altering their choice of where to live and work. Producers, who may previously be unaware of implications of their actions, will have the necessary information made available to them. In cases where the market is unlikely to provide adequate information, public intervention can provide consumers and possibly producers with information that will allow them to make better decisions. The next section provides a general discussion of the various groups that may be able to use the TRI information that is gathered by the proposed rule.

6.2.2 POTENTIAL BENEFITS OF TRI INFORMATION BY USER GROUP

The potential benefits of additional TRI reporting can be understood by examining the ways in which different groups of economic actors—consumers, industry, non-federal governments and the general public—utilize the TRI data. Consumers may use the data to make more informed decisions about the products they buy and to enter into constructive dialogue with the lead-emitting firms in their communities. Industry may find opportunities for waste reduction and cost savings through developing data to be used for reporting under the proposed rule. Non-federal governments may use the data in lieu of or in support of their own environmental protection activities. In addition, non-users of the TRI data benefit from its public provision whenever others use of the data results in improvements in environmental quality.

Some examples of the ways in which various groups have utilized TRI data include:

- *Use of the Data by Community and Public Interest Groups*: Communities use TRI data to begin dialogues with local facilities and to encourage them to reduce their emissions, develop pollution prevention plans, and improve safety measures. Public interest groups use the data to educate the public about toxic chemical emissions and potential risk.

- *Use of the Data by Education and Research Institutions*: The TRI data are being used in many environmental education programs, particularly at the high school and university levels. Students learn about toxic chemical releases, the potential health and environmental effects of those releases, pollution prevention activities and opportunities, and the social and political aspects of environmental protection. Some organizations also are conducting educational outreach programs using TRI data.

- *Use of the Data by the Financial and Business Communities*: Investment analysts use TRI data to provide recommendations to clients seeking to make environmentally sound investments. Insurance companies look to TRI data as one indication of potential environmental liabilities. Consultants and others use the data to identify business opportunities, such as marketing pollution prevention and control technologies to TRI reporting facilities. Demand for environmental performance information by investors, insurance companies, and the public has led many companies to develop environmental annual reports similar to annual reports on financial performance traditionally prepared for investors.

- *Industry Use of TRI Data*: TRI has been used by industry for activities such as developing waste reduction strategies and improving companies' understanding of their own production processes.

- *Government Use of TRI Data*: Government organizations such as the media-specific offices at EPA, EPA Regional offices, and other national, state, and local government agencies routinely use the TRI data. TRI data have been used to: identify hazardous air pollutants to be included in the Urban Area Source Program mandated by section 112(k) of the CAA; develop inspection targeting and enforcement tools; analyze long-term trends in waste minimization; identify candidates for the National Primary Drinking Water Regulations; and to set priorities and allocate increasingly scarce environmental protection resources to the most pressing problems.

6.3 ADDITIONAL INFORMATION ON RELEASES OF LEAD AND LEAD COMPOUNDS

Information on the extent of potential additional reporting on lead and lead compounds may be helpful in assessing the potential benefits associated with the proposed rule. Since the benefits of the proposed rule are related to the provision of additional information on releases and other waste management of lead and lead compounds, this section describes some of the information that may be generated by the proposed rule.

Understanding what information would be added by this proposed rule requires an examination of 1) lead and lead compounds currently reported to TRI, and 2) the total quantity of lead and lead compounds released and otherwise managed as waste. Unfortunately, due to a lack of existing comprehensive multi-media information on lead and lead compounds, it is not possible to determine how much of the total releases (and other waste management) of lead from TRI-reportable sectors is already reported to TRI. Therefore, this discussion is limited to air releases of lead and lead compounds—the one medium for which sector-level release estimates are available. Section 6.3.1 estimates the percentage of total lead and lead compound releases to air that is potentially reportable to TRI. Section 6.3.2 estimates the percentage of lead and lead compound releases to air that is already reported to TRI. Section 6.3.3 identifies some of the manufacturing sectors that appear to have currently unreported lead and lead compound releases to air.

6.3.1 LEAD AND LEAD COMPOUND RELEASES POTENTIALLY REPORTABLE TO TRI

Only lead and lead compound releases from sources that are subject to TRI is potentially reportable to TRI. TRI captures release and other waste management information from facilities in SIC codes that are subject to EPCRA Section 313. These facilities must have 10 or more employees, and they must manufacture, process, or otherwise use lead or lead compounds above threshold quantities. Certain releases and other waste management activities may not be subject to TRI reporting for the following reasons:

- they are not from facilities (e.g., cars, aircraft), or
- they are covered by a reporting exemption (e.g., motor vehicles, *de minimis*), or
- they are not from industry groups covered by TRI (e.g., residential combustion), or
- they are from facilities with fewer than 10 employees, or
- they are from facilities that manufacture, process or otherwise use less than the reporting threshold.

Under the proposed rule, EPA seeks to increase the information reported to TRI on lead and lead compound releases and other waste management by lowering the reporting threshold and eliminating the *de minimis* exemption. These changes should cause more facilities subject to EPCRA section 313 to report.

To estimate the proportion of total lead and lead compounds that are potentially reportable to TRI, it would be necessary to know 1) the total releases of lead and lead compounds to all media, 2) the total amount of lead and lead compounds managed as waste, and 3) the relative magnitude of releases and other waste management from all sources, including those that are not reportable to TRI. For facilities not currently reporting to TRI and sectors that do not report to TRI, most of this information is unavailable.

Air is the only medium for which fairly comprehensive, sector-level information on lead and lead compound releases is available. Estimates of releases of lead to air are available in the National Air Pollutant Emissions Trends (NET) Report prepared by EPA's Office of Air Quality (EPA, 1998b). The NET report is not a substitute for TRI for community right-to-know purposes.[43] However, it does allow the crude estimation of the relative magnitude of lead and lead compound releases to air from all sectors—whether reportable to TRI or not (see Table 6-2).

Based on estimates for 1996 in the NET report, up to 84 percent of lead and lead compound releases to air are potentially reportable to TRI. This percentage will actually be somewhat lower because some of the sectors classified as "TRI sectors" in Table 6-2 may include facilities or other sources that are not in TRI-reportable SIC codes (e.g., Waste disposal-other and Fuel combustion-other). Additionally, facilities with fewer than 10 employees are not required to report to TRI.

Extending this conclusion to lead and lead compound releases from other environmental media may not be appropriate. To do so would require assuming that various sources release lead and lead compounds to other media in the same proportion as they do to air. This conclusion would be stronger if most lead and lead compounds were released to air. However, based on 1996 TRI reporting, approximately 90 percent of on-site releases of lead and lead compounds are to land, with less than 10 percent of releases to air (EPA, 1998a). Unlike air, the relative contributions of TRI and non-TRI sources to land and water releases are not known.

Likewise, it may be difficult to extend this conclusion to other waste management of lead and lead compounds. Based on 1996 TRI reporting, the quantity of lead and lead compounds managed as waste is more than 25 times the quantity released to air, land, and water (EPA, 1998a). The relative contributions of TRI and non-TRI sources to total quantities of lead and lead compounds treated or recycled are not known.

[43] The NET report has a number of limitations for community right-to-know purposes: (1) air is the only environmental medium covered by the report, (2) the estimates are derived using a "top-down" approach that depends on emission factors and sector-level activity information, (3) the estimates are not facility- or region-specific, (4) estimates are not available for all sectors that TRI indicates contribute to air releases, and (5) the report does not provide any waste management or pollution prevention information.

TABLE 6-2
ESTIMATED NATIONAL RELEASES OF LEAD TO AIR, 1996

Sector	Amount (lbs)	Percent	Percent of Total
TRI sectors			
Metals processing	4,104,000	62.3%	52.5%
Waste disposal-other[44]	1,092,000	16.6%	14.0%
Fuel combustion-other[45]	800,000	12.1%	10.2%
Chemical manufacturing	334,000	5.1%	4.3%
Fuel combustion-electric utilities	122,000	1.9%	1.6%
Other industrial	102,000	1.5%	1.3%
Fuel combustion-industrial	32,000	0.5%	0.4%
Total TRI Sectors	**6,586,000**	**100.0%**	**84.2%**
Non-TRI sectors			
Non-road engines and vehicles	1,010,000	81.8%	12.9%
Waste disposal-municipal	152,000	12.3%	1.9%
On-road vehicles	40,000	3.2%	0.5%
Fuel combustion-residential/commercial	32,000	2.6%	0.4%
Total non-TRI sectors	**1,234,000**	**100.0%**	**15.8%**
Total all sectors	**7,820,000**	**--**	**100.0%**

Source: NET report (EPA, 1998b)

6.3.2 ADDITIONAL INFORMATION ON LEAD AND LEAD COMPOUNDS CAPTURED BY PROPOSED RULE

As of 1996, there were 1,623 facilities reporting releases of almost 36 million pounds of lead and lead compounds in TRI (EPA, 1998a). It is difficult to estimate how much of the total lead and lead compound releases from TRI-reportable sectors is already reported to TRI since information on *current* reporting of releases to land and water does not assist in estimating *potential* reporting. To estimate potential reporting of lead and lead compound releases,

[44] This source represents combustion of waste. Some waste may be combusted at industrial facilities. The remainder is combusted at commercial and institutional facilities in SIC codes that are not reportable to TRI.

[45] This source represents combustion of waste oil containing lead. Some waste oil may be combusted in industrial boilers. The remainder is combusted at service stations, auto repair shops, and other facilities in SIC codes that are not reportable to TRI.

comprehensive multi-media information is required. However, air is the only medium for which fairly comprehensive, sector-level information on lead and lead compound releases is available. Therefore, the discussion of potential additional reporting of release information is limited to air releases.

The NET report estimates that 5,372,000 lbs of lead and lead compounds were released to air by manufacturing industries in 1996. In this same year, only 1,805,420 lbs of air releases were reported to TRI by facilities in the manufacturing sectors.[46] Comparing the total air releases reported to TRI for lead and lead compounds with the estimated total air releases for manufacturing industries from the NET report yields an estimate of approximately 65 percent of potential releases to air unreported from TRI-reportable sectors.[47] Extending this conclusion to total lead and lead compound releases would require an assumption that sectors release lead to other media in the same proportion as to air. As noted before, land releases are the largest component of on-site releases with air releases accounting for less than 10 percent of all on-site releases (EPA, 1998a).

The previous approach accepts the NET report estimates at face value. It is possible, however, that the NET report systematically under- or overestimate releases of lead to air because of its "top-down" methodology. To evaluate this possibility, TRI and NET release amounts for 7 industry sectors were compared.[48] These sectors were selected because they may be near "full" TRI reporting for lead and lead compounds.[49] Therefore, the TRI-*reported* amounts would be expected to be similar to NET-*estimated* amounts. In addition, the 7 sectors collectively account for a large proportion of TRI-reportable emissions to air as estimated by the NET report. Table 6-3 shows the 7 sectors, the number of facilities currently reporting to TRI, the estimated number of facilities that may be eligible to report (based on employment), the air releases reported to TRI, and the air releases estimated by the NET report.

If these sectors are at or near full reporting, then it appears that the NET report tends to overestimate air releases (primary copper smelting is a significant exception). For these 7 sectors considered together, it appears that 1 pound of release is estimated in the NET report for every 0.42 pounds actually reported to TRI. Applying this factor to the total estimate for

---

[46] TRI release amounts from Section 5.1 and 5.2 of Form R. For a valid comparison, release estimates for electric utilities and waste disposal in 1996 must be excluded because these sectors were not required to report to TRI in that year.

[47] This percentage may change as amounts from electric utilities and commercial hazardous waste disposal facilities (reporting for the first time in 1998) are added into the numerator and denominator.

[48] Exact matching of facilities reporting to TRI with SIC codes can be challenging. Facilities may choose multiple SIC codes. For the table, the primary SIC code selected by a facility was used to match TRI reports to SIC codes.

[49] These sectors may be near "full" or complete TRI reporting because all or most facilities with 10 or more employees currently report to TRI. The remaining facilities are exempt from TRI reporting because they have fewer than 10 employees.

manufacturing industries from the NET report yields a smaller adjusted estimate (5,372,000 lbs x 0.42 = 2,300,000 lbs) of total air releases for manufacturing industries. If releases reported to TRI for lead and lead compounds (1,805,420 lbs) are compared with the adjusted NET report estimates (2,300,000 lbs), it appears that TRI already captures information on approximately 80% of lead releases to air. Again, this percentage may change as amounts from electric utilities and commercial hazardous waste disposal facilities (reporting for the first time in 1998) are added into the numerator and denominator. The same caveats about applying this result to releases to other media and to amounts of waste managed apply here as well.

TABLE 6-3
TRI VS. NET EMISSIONS OF LEAD AND LEAD COMPOUNDS TO AIR FOR INDUSTRIES NEAR FULL TRI REPORTING, 1996

Sector	SIC Code	# TRI reports	# facilities eligible to report[a]	TRI amount (lbs)	NET estimate (lbs)
Primary lead	3339	10	4	599,622	1,202,000
Primary zinc					
Primary copper	3331	6	6	247,023	44,000
Secondary lead	3341	64	20	157,793	1,118,000
Secondary copper			2		
Secondary aluminum[b]			53		
Storage battery mfg[c]	3691	75	98	75,653	206,000
Total				**1,080,091**	**2,570,000**

[a] USGS Mineral Commodity Surveys (1998), USGS Mineral Yearbooks (1997), and USDOC County Business Patterns (1996).

[b] Secondary Aluminum is not identified as a source in NET. It is assumed that the 64 TRI facilities reporting a primary SIC of 3341 includes the 20 secondary lead facilities and the 2 secondary copper facilities. As a class, throughput of lead at secondary aluminum facilities is expected to be small relative to secondary lead and copper facilities (<0.01%) (see Appendix A).

[c] If the 75 facilities in SIC 3691 already reporting to TRI are the largest facilities in the SIC code, then the remaining 23 facilities account for less than 3% of economic activity in the sector (see Appendix A).

6.3.3 SECTORS WITH LEAD AND LEAD COMPOUNDS RELEASES TO AIR NOT CURRENTLY REPORTED TO TRI

Another possible use of TRI/NET comparisons is to identify TRI-reportable sectors for which there appear to be unreported releases. This may be due to current reporting thresholds, and/or to the *de minimis* exemption. Analysis of certain manufacturing sectors that are not near full reporting, however, suggests that even if the adjustment factor of 0.42 is applied to the NET air emissions, TRI currently captures a much lower percentage of total air releases for some industry sectors than NET indicates is available.[50] As shown in Table 6-4, current TRI coverage for industry sectors where significant additional reporting is expected due to the proposed rule ranges from 4% to 29% of total emissions. At the preferred option presented in the regulatory text (10 lb reporting thresholds), all of these "missing" facilities would be expected to report to TRI.

TABLE 6-4
TRI VS. NET EMISSIONS OF LEAD AND LEAD COMPOUNDS TO AIR FOR SELECTED SECTORS, 1996

Sector	SIC Code	# TRI reports	# facilities eligible to report[a]	TRI amount (lbs)	Adj. NET estimate (lbs)	Current TRI Coverage
Cement manufacturing	3241	13	136	6,734	24,360	29%
Electro-metallurgical products (ferroalloys)	3313	5	29	587	6,720	9%
Gray/ductile iron foundries	3321	20	492	54,890	303,240	19%
Malleable iron foundries	3322	2	15			
Steel investment foundries	3324	1	124	4,798	134,400	4%
Steel foundries, n.e.c.	3325	8	225			
Total		**49**	**1,021**	**67,009**	**468,720**	**14%**

[a] USGS Mineral Commodity Surveys (1998), USGS Mineral Yearbooks (1997), and USDOC County Business Patterns (1996).

[50] TRI release amounts from Section 5.1 and 5.2 of Form R.

6.4 CONCLUSIONS

Economic theory suggests an important role for government action in the form of the proposed rule because of the persistent and bioaccumulative nature of lead and lead compounds. Because of their intrinsic characteristics and the lack of incentives for voluntary reporting from TRI facilities, lead and lead compounds fit the definition of post experience goods—goods whose attributes remain unknown for an indefinite period of time. In the case of post experience goods, a significant asymmetric information problem exists. In the absence of government intervention, private market forces are unlikely to address the public's need for information.

An examination of the data on air releases indicates that there are a number of industry sectors for which comprehensive TRI reporting on lead and lead compounds is currently lacking. It is unlikely that release or other waste management information will be available from facilities in these sectors without the proposed rule. Due to this current lack of information on total releases and other waste management activities, the amount of lead and lead compounds that will be reported as a result of the proposed rule cannot be quantified with precision. However, the proposed rule will result in more comprehensive reporting on lead and lead compounds.

There are two types of benefits associated with additional TRI reporting of lead and lead compounds: those resulting from the actions required by the rule (such as reporting and recordkeeping), and those derived from follow-on activities that are not required by the rule. Benefits of activities required by the rule include the value of improved knowledge about the release and waste management of lead and lead compounds, which leads to improvements in understanding, awareness and decision making. It is expected that this rulemaking will generate such benefits by providing readily accessible information that otherwise would not be available to the public.

The second type of benefits derive from changes in behavior that may result from the TRI information. These changes in behavior, including reductions in releases of and changes in the waste management practices for lead and lead compounds may yield health and environmental benefits. These changes in behavior come at some cost, and the net benefits of the follow-on activities are the difference between the benefits of decreased lead releases and transfers and the costs of the actions needed to achieve the decreases.

Because the state of knowledge of the economics of information is not highly developed, it is not possible to monetize the benefits of changing reporting thresholds for lead and lead compounds. Furthermore, because of the inherent uncertainty in the subsequent chain of events, it is not possible to predict the exact changes in behavior that will result from the information, or the resultant net benefits, (i.e., the difference between benefits and costs of follow-on activities). Currently, adequate methodologies to make reasonable monetary estimates of either the benefits of the activities required by the proposed rule, or the follow-on activities do not exist.

LITERATURE CITED

Boardman, Anthony E., David H. Greenberg, Aidan R. Vining and David L. Weimer, *Cost-Benefit Analysis: Concepts and Practice*, Upper Saddle River, NJ: Prentice-Hall Inc., 1996.

Bureau of the Census (1996). County Business Patterns, United States. CBP/96-1.

Coase, R. H., "The Problem of Social Cost," *Journal of Law and Economics* 1 (October 1960): 1-44.

Davis, J. Ronnie and Joe R. Hulett, *An Analysis of Market Failure: Externalities, Public Goods, and Mixed Goods*, Gainesville: University Press of Florida, 1977.

Field, Barry, *Environmental Economics: An Introduction*, McGraw-Hill, Inc., 1994.

Mills, Edwin S. and Philip E. Graves, *The Economics of Environmental Quality*, New York: W.W. Norton, 1986.

Nelson, Phillip, Information and Consumer Behavior, *Journal of Political Economy* 78(2), 311-329, (1970).

U.S. Environmental Protection Agency (EPA) (1998a). 1996 Toxic Release Inventory Database. Section 5: Quantity of the Toxic Chemical Entering Each Environmental Medium. Frozen 1996 data as of February 17, 1998.

U.S. Environmental Protection Agency (U.S. EPA) (1998b). National Air Pollutant Emission Trends Update: 1900-1997. Office of Air Quality Planning and Standards. EPA-454/E-98-007.

U.S. Geological Survey (USGS) (1999). Mineral Commodity Summaries - Lead, January 1999.

U.S. Geological Survey (USGS) (1998). Minerals Yearbook 1997 - Lead.

Vining, Aidan R. and David L. Weimer, Information Asymmetry Favoring Sellers: A Policy Framework, *Policy Sciences* 21, 281-303, (1988).

APPENDIX A
LEAD AND LEAD COMPOUNDS

A.1 CHEMICAL PROFILE

Lead (CASRN 7439-92-1) is a heavy, silver-white metal in its pure (elemental) form. When exposed to air, it oxidizes and turns bluish-gray. Its significant properties include a low melting point (327 C), high density, chemical resistance, and an ability to shield radiation, sound waves, and mechanical vibrations. Lead and lead compounds are used in a variety of applications including lead-acid batteries, ammunition, building construction, solder, and metal castings, particularly when alloyed with metals such as antimony, tin, arsenic, or copper. Lead compounds are used in glass and ceramic products, plastics, paints, electrical cable coverings, and lubricating oils and greases (U.S. EPA, 1998a). In 1998, an estimated 3.8 billion pounds of lead were consumed in product uses in the United States (USGS, 1999a). Lead is also a trace constituent in ores and fuels.

A.1.1 PRODUCTION

Secondary lead production accounts for approximately 76 percent of domestic lead production and is carried out at 29 smelting facilities, generating an estimated 2.28 billion pounds of lead in 1998. In 1997, approximately 98 percent of the secondary lead was produced by seventeen smelters operated by ten companies. Nearly 90 percent of secondary lead is generated from scrap lead-acid batteries (USGS, 1999a; 1998a). Furnaces are used to reduce lead compounds in scrap lead to elemental lead, which may then be refined or alloyed (U.S. EPA, 1998a).

Primary lead mining involves the extraction of galena, a mineral consisting of lead sulfide (PbS). Extractable amounts of lead may also be found in other minerals, including anglesite ($PbSO_4$), cerussite ($PbCO_3$), and some zinc-bearing ores (U.S. EPA, 1998a; USGS, 1998b). Most lead mining in the United States occurs in Missouri (76 percent of total lead mine production in the United States in 1992). However, significant mines also are located in Alaska, Colorado, Idaho, and Montana. Currently, there are sixteen lead-producing mines in the United States operated by eight companies, including ASARCO Incorporated and The Doe Run Company. Three smelters, operated by two of those companies, process the lead ore, yielding an estimated 728 million pounds of lead in 1998 (USGS, 1999a, 1998a; U.S. EPA, 1998a).

A.1.2 USES

Lead and lead compounds are used in the manufacture of lead-acid batteries, ammunition, ceramics and glass products, lead chemical products, and metal products including sheet lead, casting metals, solder, bearing metals, extruded products, and brass and bronze alloys. Table A-1 presents the 1997 domestic consumption of lead by product. The most prominent uses of lead and lead compounds are described below.

The manufacture of batteries is the largest lead-consuming process in the United States, accounting for 87 percent of lead consumption in 1997 (USGS, 1998a). Lead compounds are used in batteries because of lead's resistance to corrosiveness of sulfuric acid and because it is an inexpensive material. Lead-antimony alloys are typically used for the internal grid of the battery, as well as the posts connecting the battery to the apparatus being powered. Lead-acid batteries are used for starting, lighting, and ignition (SLI) in automobiles and other mobile devices, as well as stationary industrial uses such as uninterruptible power sources for hospitals and computer networks.

TABLE A-1
U.S. CONSUMPTION OF LEAD BY PRODUCT, 1997

Product	Consumption (million lbs)	Percent
Storage batteries	3,066	87.0%
Oxides, pigments, and ceramics products	149	4.2%
Ammunition, shot and bullets	122	3.5%
Sheet lead	42	1.2%
Casting metals	40	1.2%
Solder	22	0.6%
Miscellaneous	19	0.5%
Other metal products	17	0.5%
Cable covering, power and communication	11	0.3%
Brass and bronze, billets and ingots	10	0.3%
Bearing metals	5	0.2%
Pipes, traps, and other extruded products	4	0.1%
Caulking lead, building construction	3	0.1%
TOTAL	**3,510**	**100.0%**

Source: USGS, 1998a

Lead is used extensively in the ceramics industry. Lead compounds are incorporated into glazes and enamels applied to ceramic products to enhance physical performance traits. Lead additives improve the durability, color, scratch resistance, and bonding of the glaze. Lead content in foodware, however, is restricted to reduce health hazards (U.S. EPA, 1998a). When alloyed with zirconium and titanium, lead plays an important role as a component of ceramics in electronics applications because of its physical characteristics and higher-temperature applications (U.S. EPA, 1991). Lead is also used extensively in the glass industry for many of its physical properties, including high density and ability to absorb radiation (television and X-ray shielding), excellent insulation and low melting point (fluorescent lights and neon signs), and high index of refraction (optical glass) (U.S. EPA, 1998a; SGCD, 1999).

Lead is commonly used in ammunition because of its high density. The concentration of lead in ammunition is typically 99.7 to 99.9 percent; however, lead is sometimes alloyed with antimony, tin, or arsenic to increase the melting temperature, hardness, or surface tension of the

bullets or pellets. In 1997, 122 million pounds of lead were consumed for ammunition, most of it from secondary (recycled) lead (USGS, 1998a).

Various other industries use metal products containing lead and lead compounds. These metal products include sheet lead, casting metals, solder, bearing metals, extruded products, and brass and bronze alloys. Lead is incorporated because of its malleability, ability to absorb radiation, density, and lubrication properties. In 1997, 140 million pounds of lead in such products were consumed.

A.1.3 RELEASES

Aside from the Toxics Release Inventory, no comprehensive, multimedia, national estimates of lead releases and other waste management are currently available. However, using a "top-down" emission factor approach, EPA has estimated that approximately 7.8 million pounds of lead were released to air by anthropogenic sources in 1996. Of this amount, 58.1 percent (4.5 million pounds) was estimated to be emitted by manufacturing sources, 28.5 percent (2.2 million pounds) resulted from waste or fossil fuel combustion at point sources, and 13.4 percent (1.0 million pounds) was generated from mobile sources (U.S. EPA, 1998b).[51] Table A-2 summarizes the estimated 1996 emissions of lead by source category.

Nonferrous and ferrous metals processing (smelting and refining) is associated with the largest air releases of lead, generating an estimated 4.1 million pounds of lead emissions in 1996 (U.S. EPA, 1998b). A large portion of the emissions is from fugitive dust generated from lead-containing ore, while additional emissions originate from furnace exhaust. Primary lead production is the largest source of lead air emissions within metals processing with an estimated 1.2 million pounds of lead emitted, followed by secondary lead production, gray iron production, metal mining, steel production, and lead battery manufacture (U.S. EPA, 1998b).

Another significant source of lead emissions to air is waste incineration. In 1996, an estimated 1.2 million pounds of lead were emitted from incinerators. Of this amount, an estimated 152,000 pounds were emitted by municipal waste incinerators, while the remainder was emitted by various industrial and hazardous waste incinerators, including those incinerating medical, hazardous, sewage sludge, and industrial materials. The lead content of the emissions depends heavily on the material burned; for example, medical waste containing bags with lead-containing red pigment will have high lead emissions, while a hazardous waste incinerator burning mostly organic solvents will have low lead emissions (U.S. EPA, 1998b). U.S. EPA has recently issued standards to reduce air emissions (including lead) from medical waste incinerators and municipal waste combustors. U.S. EPA has also proposed revised emission standards for hazardous waste incinerators for the same purpose.

---

[51]These estimates were based on emission factors applied to measures of national activity (e.g., fuel consumption or raw material throughput) for each emission source. It should be noted that this approach underestimates total releases, at least for manufacturing sources. Releases from manufacturing sources as reported to TRI totaled almost 36 million pounds as shown in Tables A-3 and A-4. Additionally, this approach does not identify some of the manufacturing sectors with the largest releases as reported to TRI.

TABLE A-2
ESTIMATED TOTAL U.S. EMISSIONS OF LEAD TO AIR, 1996

Source Category	Emissions (pounds)	Percent
Manufacturing Sources (a)	**4,114,000**	**52.6%**
Nonferrous metals processing	2,426,000	31.0%
primary lead production	*1,176,000*	*15.0%*
primary copper production	*44,000*	*0.6%*
primary zinc production	*26,000*	*0.3%*
secondary lead production	*1,028,000*	*13.1%*
secondary copper production	*152,000*	*1.9%*
Ferrous metals processing	1,058,000	13.5%
ferroalloy production	*16,000*	*0.2%*
iron production	*36,000*	*0.5%*
steel production	*320,000*	*4.1%*
gray iron production	*686,000*	*8.8%*
Lead oxide and pigments	334,000	4.3%
Lead battery manufacture	206,000	2.6%
Cement manufacturing	58,000	0.7%
Cable covering	32,000	0.4%
Combustion Sources	**2,230,000**	**28.5%**
Electric utilities (b)	122,000	1.6%
coal	*104,000*	*1.3%*
oil	*16,000*	*0.2%*
Industrial	32,000	0.4%
coal	*26,000*	*0.3%*
oil	*6,000*	*0.1%*
Other fuel	832,000	10.6%
Waste incineration	1,244,000	15.9%
municipal waste	*152,000*	*1.9%*
other waste incineration	*1,092,000*	*14.0%*
Mobile Sources	**1,050,000**	**13.4%**
On-road vehicles	40,000	0.5%
Non-road engines and vehicles	1,010,000	12.9%
Other Industrial Processes	**428,000**	**5.5%**
Metal mining	384,000	4.9%
Miscellaneous industrial processes	44,000	0.6%
TOTAL	7,822,000	100.0%

Source: U.S. EPA, 1998b

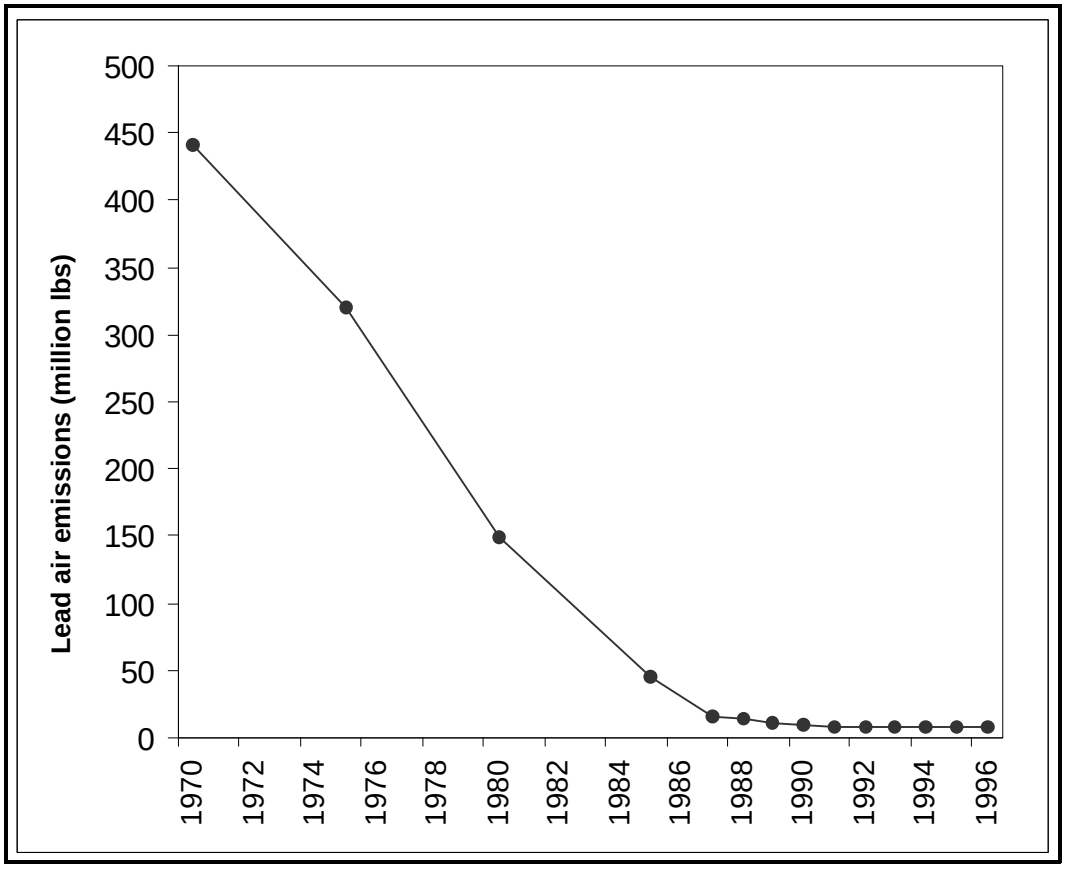
(a) Total for Manufacturing Sources does not sum exactly due to rounding.

(b) Electric utility numbers in U.S. EPA, 1998b do not sum to total (given in short tons).

Lead emissions from piston-engine aircraft (1.0 million pounds) generate the bulk of mobile source lead emissions (U.S. EPA, 1998b). While the Clean Air Act banned the use of lead in motor vehicle gasoline in the United States after 1995, lead is still used as a fuel additive in gasoline for piston-engine aircraft (U.S. EPA, 1998a).

There have been significant reductions in the amount of lead released to air over the past three decades. In 1970, an estimated 442 million pounds of lead were released to air, of which 78 percent were emitted from on-road vehicles. From 1970 to 1996, estimated lead air emissions were reduced 98 percent, mostly as a result of a ban on leaded gas for motor vehicles (U.S. EPA, 1998b). See Figure A-1 below. Lead emissions have also been reduced due to restrictions limiting lead content in plumbing pipes and paints.

FIGURE A-1
ESTIMATED TOTAL U.S. EMISSIONS OF LEAD TO AIR, 1970 - 1996



A.2 CURRENT TOXICS RELEASE INVENTORY STATUS

Lead and lead compounds are currently listed chemicals on the Toxics Release Inventory (TRI). The current reporting thresholds are 25,000 pounds per year for manufacturing (including importing) or processing, and 10,000 pounds per year for otherwise using lead and lead compounds.

Under current reporting requirements, there is an exemption for toxic chemicals in mixtures or trade name products below *de minimis* concentrations. The concentration is 0.1 percent for lead and inorganic lead compounds, and 1.0 percent for organic lead compounds. The manufacture as an impurity, processing, or otherwise use of lead and lead compounds in mixtures or trade name products below the *de minimis* level is exempt from reporting. The *de minimis* exemption does not apply to the manufacture of lead or lead compound byproducts or waste.

In 1996, a total of 1,623 unique facilities reported to TRI for lead and/or lead compounds. While there have been fluctuations from year to year, total air emissions and on-site releases in 1996 have declined 33 and 44 percent, respectively, from 1988 baseline reporting. Since 1991, total off-site transfers have increased 36 percent (U.S. EPA, 1998c).

The total releases of lead and lead compounds (excluding recycling) as reported to TRI in 1996 are presented in Tables A-3 and A-4. Facilities report the quantity of toxic chemical released in Section 8.1 of Form R; this quantity includes "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing [on-site or off-site] into the environment (including the abandonment of barrels, containers, and other closed receptacles)." Total Section 8 releases are the total quantity released (8.1), quantity used for energy recovery on-site (8.2) and off-site (8.3), quantity recycled on-site (8.4) and off-site (8.5), quantity treated on-site (8.6) and off-site (8.7), and quantity released to the environment "as a result of remedial actions, catastrophic events, or one-time events not associated with production processes" (8.8) (U.S. EPA, 1999b). Tables A-3 and A-4 show lead and lead compound releases both with and without the quantity recycled on-site and off-site.

A.2.1 LEAD

The Section 8.1 releases of lead from TRI facilities equaled 5.9 million pounds in 1996. A total of 10 million pounds of lead was reported for Section 8, excluding recycling. The top three industries reporting lead (by number of reports and by total Section 8 releases excluding recycling) were the following:

- Primary Metal Industries (SIC 33),
- Fabricated Metal Products (SIC 34), and
- Electronic and Other Electrical Equipment and Components (SIC 36).

A.2.2 LEAD COMPOUNDS

The Section 8.1 releases of lead compounds from TRI facilities equaled almost 30 million pounds in 1996. Almost 40 million pounds of lead compounds was reported for Section 8, excluding recycling. The top three industries reporting lead compounds (by number of reports) were the following:

- Primary Metal Industries (SIC 33),
- Electronic and Other Electrical Equipment and Components (SIC 36), and
- Chemicals and Allied Products (SIC 28).

The top three industries reporting lead compounds (by total Section 8 releases excluding recycling) were slightly different:

- Primary Metal Industries (SIC 33);
- Stone, Clay, Glass, and Concrete Products (SIC 32); and
- Electronic and Other Electrical Equipment and Components (SIC 36).

TABLE A-3
SUMMARY OF TRI REPORTING FOR LEAD, 1996

SIC Code and Name	Number of Form R Reports	Number of Form A Reports	Section 8.1 Releases (pounds)	Total Section 8 Releases (pounds)	Total Section 8 Releases, Excluding Recycling (pounds)
20 - Food and Kindred Products	1	0	0	0	0
22 - Textile Mill Products	3	0	5,254	8,434	5,934
24 - Lumber and Wood Products, Except Furniture	3	0	130	130	130
25 - Furniture and Fixtures	3	2	8,290	49,379	16,578
26 - Paper and Allied Products	1	0	0	0	0
27 - Printing, Publishing, and Allied Industries	1	0	89	57,297	89
28 - Chemicals and Allied Products	14	3	793	308,844	84,535
29 - Petroleum Refining and Related Industries	10	1	1,758	30,399	29,866
30 - Rubber and Miscellaneous Plastics	16	2	19,402	1,392,739	22,795
32 - Stone, Clay, Glass, and Concrete	22	1	126,325	864,727	236,132
33 - Primary Metal Industries	248	17	5,035,921	214,997,004	8,391,837
34 - Fabricated Metal Products, except Machinery and Transportation Eqpt.	187	15	274,466	16,665,929	425,242
35 - Industrial and Commercial Machinery and Computer Equipment	40	5	90,905	1,699,825	99,802
36 - Electronic and Other Electrical Equipment and Components	98	3	195,450	10,876,419	632,149
37 - Transportation Equipment	65	3	76,726	5,933,525	147,628
38 - Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	12	0	2,551	432,314	2,872
39 - Miscellaneous Manufacturing	8	3	17,628	2,131,618	24,316
49 - Electric, Gas, and Sanitary	1	0	69	2,124	2,124
50 - Wholesale Trade – Durable Goods	1	0	642	64,114	642
87 - Engineering, Accounting, Research, Management, and Related Services	1	0	3,355	105,055	3,355
97 - National Security and Int'l Affairs	2	0	44,238	80,510	62,374
No SIC Reported	1	0	1	2	1
TOTAL	**738**	**55**	**5,903,993**	**255,700,388**	**10,188,401**

Source: Toxic Release Inventory (U.S. EPA, 1998c)

TABLE A-4
SUMMARY OF TRI REPORTING FOR LEAD COMPOUNDS, 1996

SIC Code and Name	Number of Form R Reports	Number of Form A Reports	Section 8.1 Releases (pounds)	Total Section 8 Releases (pounds)	Total Section 8 Releases, Excluding Recycling (pounds)
10 - Metal Mining	1	0	0	0	0
22 - Textile Mill Products	5	0	15,009	37,016	17,688
26 - Paper and Allied Products	2	0	4,105	4,355	4,355
28 - Chemicals and Allied Products	121	27	297,421	6,716,664	1,521,614
29 - Petroleum Refining and Related Industries	27	3	70,904	265,845	93,167
30 - Rubber and Miscellaneous Plastics	78	15	99,124	90,679,685	120,173
32 - Stone, Clay, Glass, and Concrete	52	2	2,875,157	101,477,703	3,423,126
33 - Primary Metal Industries	238	15	24,858,099	176,854,568	32,222,105
34 - Fabricated Metal Products, except Machinery and Transportation Equipment	44	7	190,771	1,929,721	221,896
35 - Industrial and Commercial Machinery and Computer Equipment	13	2	43,634	655,158	68,522
36 - Electronic and Other Electrical Equipment and Components	142	2	1,199,455	372,907,861	1,774,953
37 - Transportation Equipment	49	0	130,800	1,678,325	162,258
38 - Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	4	0	274	79,607	344
39 - Miscellaneous Manufacturing	5	0	1,670	82,830	2,888
49 - Electric, Gas, and Sanitary Services	1	0	560	560	560
67 - Holding and Other Investment Offices	1	0	52	52	52
97 - National Security and International Affairs	1	0	610	1,235	815
TOTAL	**784**	**73**	**29,787,645**	**753,371,185**	**39,634,516**

Source: Toxic Release Inventory (U.S. EPA, 1998c)

A.3 ESTIMATED NUMBER OF ADDITIONAL REPORTS

This section estimates the number of additional TRI reports that may be submitted for lead and lead compounds, assuming the reporting thresholds are lowered. Four lower threshold levels were analyzed: 1 pound; 10 pounds; 100 pounds; and 1,000 pounds. This analysis also assumes the *de minimis* exemption would be eliminated; thus, TRI reporting would be expected from facilities manufacturing, processing, or otherwise using lead and/or lead compounds above the lower threshold levels, regardless of the concentration.

Lead and lead compounds were considered together since facilities can file a combined report if thresholds are exceeded for both the parent metals and compounds of that same metal. This analysis assumes that facilities exceeding lower thresholds for both lead and lead compounds will file a single report.

A.3.1 ANALYTICAL METHODS

To predict the number of reports at each of the lower thresholds, information on the amount of lead manufactured, processed, or otherwise used by each facility in each TRI-subject SIC code is required. Facility-level lead use data, however, were not available for most industries. Therefore, for this analysis, it was necessary to formulate approaches with which the available data could be used to develop best estimates of the number of reports. Due to limitations in industry-specific data, a number of assumptions were made in developing estimates of the number of additional reports. A number of approaches were developed, depending on the type of data available for the industry group. The following methods are described in more detail in the following subsection.

- Lead Production/Consumption Method
- Lead Concentration Method
- Air Emission Factor Method
- Sector Air Emissions Method
- Facility-specific Data Method
- Combustion Data Method

For several industries (commercial hazardous waste treatment–SIC 4953, petroleum bulk stations and terminals–SIC 5171, and solvent recovery services–SIC 7389), additional methods were used to estimate the number of reports. These approaches are discussed in detail in the specific subsection for each SIC code.

For many of the methods listed above, this analysis used employment size class (i.e., the number of employees) to approximate a distribution of lead use within an industry. Estimating a distribution of lead use helps differentiate between small and large facilities and provides a more accurate estimate than an average amount of lead use per facility across an entire industry. This analysis assumed that lead use was proportional to the cost of materials or value of shipments

(for metal mining), two measures of throughput. For most industries, cost of materials and value of shipments data were available by employment size class (Bureau of the Census, 1992). For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class. To obtain these estimates, it was assumed that all facilities in each industry manufacture, process, or otherwise use lead in their operations.

Lead Production/Consumption Method

This method uses lead production or consumption data from the U.S. Geological Survey (1998a, 1999a) to determine the amount of lead produced or consumed per facility in primary and secondary lead smelting and refining, inorganic pigments, brass and bronze, small arms ammunition, electronic components, storage battery, and motor vehicle industries. This method involved the following steps:

- Estimate the number of facilities by facility size or employment size category;
- Determine the total lead production or consumption for the sector;
- Estimate the amount of lead produced or consumed by each size category using available production or consumption data;
- Calculate the average lead use per facility by size category; and
- Determine the number of facilities exceeding the lower reporting thresholds.

Lead Concentration Method

This method uses lead concentration estimates and production data to estimate the amount of lead in the metal mining, coal mining, iron and steel, and primary copper smelting industries. In addition, the concentration of lead in crude oil was applied to facility-specific throughput data for petroleum refining (see "Facility-specific Data Method" below). The lead concentration method involved the following steps:

- Estimate the number of facilities by employment size class (i.e., by number of employees);
- Estimate the production throughput by employment size class using cost of materials or value of shipments as a proxy for materials throughput;
- Determine the concentration of lead as a trace constituent;
- Estimate the amount of lead by employment size class by multiplying materials throughput by the lead concentration;
- Calculate the average lead use per facility by employment size class; and
- Determine the number of facilities exceeding the lower reporting thresholds.

Air Emission Factor Method

This method uses lead and lead compound air emissions as a proxy for minimum lead and lead compound use. Because total lead use exceeds the amount of lead emitted to air (particularly if pollution control devices are used), this method underestimates the total amount of lead used by a facility. For many industries, lead and lead compound air emissions in each employment size class were estimated by multiplying the production throughput of each class by the emission factor for that industry (U.S. EPA, 1998a). This method was applied to the pulp mill, asphalt paving, iron foundry, and primary and secondary metals smelting industries. In addition, a lead air emission factor was applied to facility-specific throughput data for cement manufacturing (see "Facility-specific Data Method" below). However, considerable uncertainty is introduced by applying emission factors to industry throughputs because the emission factors are almost always based on limited data and because there are different technologies used in different facilities in the same industry. The approach involved the following steps:

- Estimate the number of facilities by employment size class (i.e., by number of employees);
- Estimate the production throughput by employment size class using cost of materials as a proxy for production;
- Determine the lead emission factor based on activity;
- Estimate the amount of lead (based on air emissions) by employment size class by multiplying throughput by the lead emission factor;
- Calculate the average lead use per facility by employment size class; and
- Determine the number of facilities exceeding the lower reporting thresholds.

Sector Air Emissions Method

This method also uses lead and lead compound air emissions as a proxy for minimum lead and lead compound use; therefore, the Sector Air Emissions Method also underestimates the total amount of lead used by a facility. Unlike the Air Emission Factor Method, this method uses air emission estimates for an entire industry sector and does not depend on throughput data to determine total lead use. Sector-wide estimates from the National Air Pollutant Emission Trends Update were used to estimate the amount of lead in ferroalloy manufacturers and steel foundries (U.S. EPA, 1998b). This approach involved the following steps:

- Estimate the number of facilities that manufacture, process, or otherwise use lead by employment size class (i.e., by number of employees);
- Estimate the total lead air emissions for the sector;
- Estimate the amount of lead (based on air emissions) by employment size class using cost of materials as a proxy for production;
- Calculate the average lead use per facility by employment size class; and
- Determine the number of facilities exceeding the lower reporting thresholds.

Facility-specific Data Method

Facility-specific production throughput data were available for two sectors: petroleum refining and cement manufacturing. This method used facility-specific data to estimate additional numbers of reports. The concentration of lead in crude oil was applied to crude oil distillation capacity data for petroleum refineries, and a lead air emission factor was applied to clinker production capacity data for cement kilns. The approach involved the following steps:

- Estimate the number of facilities;
- Obtain facility-specific production throughput data;
- Determine the lead emission factor or concentration of lead as a trace contaminant;
- Estimate the activity required to trip each of the four lower thresholds by dividing each threshold by the lead concentration of emission factor; and
- Determine the number of facilities exceeding the lower reporting thresholds.

As stated previously, using lead and lead compound air emissions as a proxy for minimum lead and lead compound use (for cement kilns) underestimates the total amount of lead.

Combustion Data Method

Lead is also found in fuels used by manufacturing facilities and electric utilities and may also be created as a byproduct of the combustion process. Because industrial boilers may be found in many manufacturing sectors, manufacturing facilities may have both process and combustion sources of lead. The approach used to estimate the number of manufacturing facilities (SIC 20-39) and electric utilities (SIC 4911, 4931, and 4939) that are expected to exceed the lower TRI reporting thresholds for lead as a result of fuel usage included the following steps:

- Determine typical concentrations for lead in the various fuels;
- Calculate the minimum annual throughput of various fuels needed to exceed each of the lower thresholds;
- Estimate the percentage of facilities that burn enough fuel to exceed the threshold for lead; and
- Estimate the total number of facilities expected to submit reports at each of the lower reporting thresholds.

Because manufacturing facilities may have both process-specific and combustion sources of lead, double-counting is addressed by subtracting out the overlap of process and combustion sources at the two-digit SIC level.

A.3.2 DETERMINING ADDITIONAL REPORTS FOR EACH INDUSTRY

Industries Not Expected to Submit Additional TRI Reports

Two industry groups that already report to TRI under current reporting thresholds are not expected to submit additional TRI reports under the proposed lead rule: metal mining (SIC 1021, 1031) and primary smelting and refining of nonferrous metals (SIC 3331, 3339). All facilities in these SIC codes subject to Section 313 reporting are expected to report at the current thresholds.

Copper ore mining (SIC 1021) and lead and zinc ore mining (SIC 1031) facilities are assumed to be processing lead and lead compounds at levels exceeding current TRI thresholds, based on the high volume of ore produced. The concentrations of lead in copper, lead, and zinc ores are all above the current *de minimis* level (U.S. EPA, 1998a); therefore, the *de minimis* exemption does not apply. Although the first year of TRI reporting has not yet been received from these sectors, based on available information it appears that all 34 copper ore mining facilities and all 23 lead and zinc ore mining facilities will report on lead or lead compounds at current thresholds (see Tables A-5 and A-6).

TABLE A-5
SIC 1021: COPPER ORES

Facility size by number of employees [a]	Number of facilities [b]	Value of shipments [c] (million $)	Percent of total	Amount of ore produced annually [d] (million lbs)	Lead concentration [e] (lb Pb/lb ore)	Amount of lead (million lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	18	1.8	0.1%	2	0.011	0.0	1,330
10 to 249	18	318.1	9.4%	385	0.011	4.2	235,015
250 to 499	6	416.3	12.3%	503	0.011	5.5	922,699
500 to 999	7	1,470.9	43.6%	1,778	0.011	19.6	2,794,409
1,000 to 2,499	3	1,167.7	34.6%	1,412	0.011	15.5	5,176,245
Total	52	3,374.8	100.0%	4,080		44.9	

a. Some employee categories were combined because of combined cost of supplies data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1999a. It was assumed that production was proportional to the cost of supplies for each facility size class.
e. U.S. EPA, 1998a, p. 4-62. The lead content percentages for copper, copper-lead, copper-zinc, and copper-lead-zinc ore were averaged.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.
g. USGS, 1999a; the amount of lead and zinc ore produced was summed together.
h. U.S. EPA, 1998a, p. 4-62. The lead content percentages for lead, zinc, and lead-zinc ore were averaged.

TABLE A-6
SIC 1031: LEAD AND ZINC ORES

Facility size [a]	Number of facilities [b]	Value of shipments [c] (million $)	Percent of total	Amount of ore produced annually [g] (million lbs)	Lead concentration [h] (lb Pb/lb ore)	Amount of lead (million lbs)	Average amount of lead per facility (lbs)
1 to 9	11	1.4	0.3%	7	0.024	0.2	15,859
10 to 49	8	52.4	11.1%	272	0.024	6.5	816,147
50 to 499	15	418.1	88.6%	2,171	0.024	52.1	3,473,092
Total	34	471.9	100.0%	2,450		58.8	

a. Some employee categories were combined because of combined cost of supplies data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1999a. It was assumed that production was proportional to the cost of supplies for each facility size class.
e. U.S. EPA, 1998a, p. 4-62. The lead content percentages for copper, copper-lead, copper-zinc, and copper-lead-zinc ore were averaged.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.
g. USGS, 1999a; the amount of lead and zinc ore produced was summed together.
h. U.S. EPA, 1998a, p. 4-62. The lead content percentages for lead, zinc, and lead-zinc ore were averaged.

Primary copper smelters (SIC 3331) and primary lead and zinc smelters (SIC 3339) are also assumed to be processing and/or coincidentally manufacturing lead and lead compounds at levels exceeding current TRI thresholds based on current production levels. Therefore, the proposed rule is not expected to result in additional reports from facilities in either of these industry groups (see Tables A-7 and A-8). Currently, 6 primary copper smelters and 4 primary lead and zinc smelters report to TRI for lead or lead compounds.

TABLE A-7
SIC 3331: PRIMARY SMELTING AND REFINING OF COPPER

Method 1:

Number of facilities [a]	Total copper produced [b] (million lbs)	Amount of lead [c] (million lbs)	Average amount of lead per facility (million lbs)
6	4,670	47	7.8

Method 2:

Number of facilities [a]	Total copper produced [b] (million lbs)	Amount of lead [c] (million lbs)	Average amount of lead per facility (million lbs)
6	4,670	3.0	492,944

a. The number of facilities in USGS, 1999d was multiplied by the percent of establishments in SIC 3331 that had 10 or more employees (86.4%) (Bureau of the Census, 1996b).

b. USGS, 1999d. This amount was multiplied by the percent of cost of materials for facilities in SIC 3331 with 10 or more employees (99.0%) (Bureau of the Census, 1992).

c. Method 1 assumes that the copper concentrate input contains 1% lead ("Input impurities [including lead] are typically found in combined concentrations of less than one percent" [USGS, 1999d]).

d. Method 2 calculates the amount of lead using a combined air emission factor from two process steps, both without control devices (U.S. EPA, 1998a, p. 4-28). Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead. This method also estimates the amount of concentrated copper ore consumed assuming the concentrated ore has 27% copper content and that 100% of the copper is in the product (U.S. EPA, 1998a, p. 4-23).

TABLE A-8
SIC 3339: PRIMARY SMELTING AND REFINING OF NONFERROUS METALS, EXCEPT COPPER AND ALUMINUM

Primary lead smelting:

Number of facilities [a]	Lead produced [b] (million lbs)	Average amount of lead produced per facility (million lbs)
2	714	357

Primary zinc smelting:

Number of facilities [c]	Zinc produced [d] (million lbs)	Amount of lead (lbs)	Average amount of lead produced per facility (lbs)
2	529	[e]	[e]

a. The number of facilities in USGS, 1999a, was multiplied by the percent of establishments in SIC 3339 that had 10 or more employees (50.8%) (Bureau of the Census, 1996b).
b. USGS, 1999a. This amount was multiplied by the percent of cost of materials for facilities in SIC 3339 with 10 or more employees (98.0%) (Bureau of the Census, 1992).
c. The number of facilities in USGS, 1999e, was multiplied by the percent of establishments in SIC 3339 that had 10 or more employees (50.8%) (Bureau of the Census, 1996b).
d. USGS, 1999e. This amount was multiplied by the percent of cost of materials for facilities in SIC 3339 with 10 or more employees (98.0%) (Bureau of the Census, 1992).
e. The amount of lead in concentrated zinc ore is needed to calculate the amount of lead.

Coal Mining (SIC Code 12)

Coal mining industry facilities, except coal mining services (SIC 1241) and all coal extraction activities, may be required to report for lead, which is a trace constituent in coal. The Lead Concentration Method was used to estimate the number of lead reports from the coal mining sector. To limit the analysis only to facilities with ten or more employees, the amount of coal produced was multiplied by the percent of value of shipments for facilities in SIC 122 and 123 (TRI-subject subgroups within SIC 12) with ten or more employees (96.6%) (Bureau of the Census, 1992). The total amount of lead was calculated by multiplying the adjusted coal production by a typical concentration of lead in coal (111 parts per million [ppm] by weight) (U.S. EPA, 1997a). The amount of lead per facility was calculated by dividing the total amount of lead by the number of facilities with ten or more employees (321) (U.S. EPA, 1997a) (see Table A-9).

Although the first year of TRI reporting has not yet been received from this sector, based on available information it appears that no coal mining facilities will report on lead or lead compounds at current thresholds. An additional 321 facilities in SIC 12 are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds (1; 10; 100; and 1,000 lbs). If the *de minimis* exemption were not eliminated, however, no additional reports would be expected, because the concentration of lead in coal is below the *de minimis* level.

TABLE A-9
SIC 12: COAL MINING

Number of facilities with 10 or more employees [a]	Amount of coal produced [b] (million lbs)	Lead concentration [c] (lbs Pb/ million lbs)	Amount of lead (million lbs)	Average amount of lead per facility (lbs)
321	199,570	111	22.2	69,010

a. U.S. EPA, 1997a. This number excludes coal extraction and mining services facilities, but includes co-located mines and preparation plants.
b. Department of Energy, 1995. This amount was multiplied by the percent of value of shipments for facilities in SIC 122 and 123 with 10 or more employees (96.6%) (Bureau of the Census, 1992).
c. U.S. EPA, 1997a.

Pulp Mills (SIC Code 2611)

Pulp mills have several potential sources of lead and lead compound emissions. Chemical-recovery furnaces (kraft and sulfite) emit lead as a result of contaminants in process chemicals and trace amounts in wood. Another potential source of lead in pulp mills are smelt-dissolving tanks, which may release lead found in the process chemicals. Smelt (molten inorganic process chemicals) from the recovery furnace is treated in a dissolving tank to recover Na_2S and NaOH. Lime kilns are a third potential source of lead within a pulp mill. A lime kiln is a process heater used to convert lime mud ($CaCO_3$) to burnt lime (CaO), which is used in the recovery of Na_2S and NaOH. Lime kilns may release lead found as a contaminant in lime muds and calcium salts (U.S. EPA, 1998a).

The Air Emission Factor Method was used to estimate the number of lead reports for SIC 2611. For kraft recovery furnaces and smelt-dissolving tanks, black liquor consumption was assumed to be proportional to the cost of materials for each employment size class (U.S. EPA, 1997b; Bureau of the Census, 1992). Lead and lead compound emissions from sulfite recovery furnaces were not estimated due to lack of data on red liquor solids consumption. For lime kilns, activity was measured by the amount of dry pulp produced and was also assumed to be proportional to the cost of materials for each employment size class.

The total amount of lead for each employment size class was calculated by multiplying the activity levels for kraft recovery furnaces and lime kilns by their respective emission factors. The emission factor for smelt-dissolving tanks was incorporated into the kraft recovery furnace emission factor because both emission factors share the same activity basis (i.e., amount of black liquor consumed). The emission factor for nondirect contact kraft recovery furnaces and smelt-dissolving tanks (both with pollution control devices) was 0.0715 pounds of lead per million pounds of black liquor consumed (U.S. EPA, 1998a). Because of a lack of facility-specific process data, it was assumed that all pulp mills have kraft recovery boilers, smelt-dissolving tanks, and lime kilns. The estimated amounts of lead from each process step were summed together. For each employment size class, the average amount of lead per facility was calculated

by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Tables A-10a, A-10b, and A-10c).

Currently, no pulp mills report to TRI for lead or lead compounds. At the 1- or 10-pound thresholds, an additional 48 pulp mills are estimated to submit TRI reports for lead and lead compounds. An additional 29 pulp mills are estimated to report lead at the 100-pound threshold, while no pulp mills are expected to report for lead at the 1,000-pound threshold. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Pulp mills may be able to take advantage of the *de minimis* exemption if the concentration of lead in process chemicals, lime mud, wood, and fossil fuel are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-10a
SIC 2611: PULP MILLS
(Kraft black liquor recovery boilers)

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Black liquor consumed [d] (million lbs)	Amount of lead [e] (lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	14	[c]	[c]	[c]	[c]	[c]
10 to 49	15	40.3	1.4%	2,427	174	12
50 to 99	4	47.4	1.6%	2,855	204	51
100 to 249	7	348.6	11.8%	20,995	1,501	214
250 to 499	9	848.6	28.7%	51,108	3,654	406
500 to 2,499	13	1,672.8	56.6%	100,746	7,203	554
Total	62	2,957.7	100.0%	178,130	12,736	

TABLE A-10b
SIC 2611: PULP MILLS
(Lime kilns)

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Pulp produced (dry basis) [g] (million lbs)	Amount of lead [h] (lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	14	[c]	[c]	[c]	[c]	[c]
10 to 49	15	40.3	1.4%	1,793	98	7
50 to 99	4	47.4	1.6%	2,109	115	29
100 to 249	7	348.6	11.8%	15,514	845	121
250 to 499	9	848.6	28.7%	37,765	2,058	229
500 to 2,499	13	1,672.8	56.6%	74,444	4,057	312
Total	62	2,957.7	100.0%	131,626	7,174	

TABLE A-10c
SIC 2611: PULP MILLS
(Total)

Facility size by number of employees [a]	Number of facilities [b]	Average amount of lead per facility [i] (lbs)
1 to 9	14	[c]
10 to 49	15	18
50 to 99	4	80
100 to 249	7	335
250 to 499	9	635
500 to 2,499	13	866
Total	62	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992. While Bureau of the Census, 1996b, presents 14 establishments for facilities with less than 10 employees, the Bureau of the Census, 1992, presents no establishments with less than 10 employees; therefore, there is no cost of materials data available for this facility size category.
d. U.S. EPA, 1998g, p. 5-23. It was assumed that consumption was proportional to the cost of materials for each facility size class.
e. The amount of lead was calculated using an air emission factor of 0.0715 lb Pb/MMlb of black liquor consumed; this is sum of two emission factors for nondirect contact recovery furnaces and smelt dissolving tank, both with control devices. U.S. EPA, 1998a, p. 5-109. Because total lead use is greater than lead emitted to air (especially after controls), this method underestimates the amount of total lead.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.
g. Bureau of the Census, 1992. It was assumed that production was proportional to the cost of materials for each facility size class.
h. The amount of lead was calculated using an air emission factor of 0.0545 lb Pb/MMlb of pulp produced (dry basis) without any control device, U.S. EPA, 1998a, p. 5-112. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
i. The average amount of lead per facility is the sum of the average amounts due to black liquor recovery boilers and lime kilns in pulp mills.

Inorganic Pigments (SIC Code 2816)

Lead oxide is used as a pigment in paints and ceramic glazes. The main lead oxides are litharge (lead monoxide–PbO), lead dioxide (PbO_2), and red lead (lead tetroxide–Pb_3O_4). Other lead pigments include basic lead carbonate ($2PbCO_3\ Pb(OH)_2$), lead chromate ($PbCrO_4$), basic lead silicate ($PbO\ SiO_2$), basic lead sulfate ($PbO\ PbSO_4$), and leaded zinc oxides. Most of these compounds are derived from litharge, which is consequently reacted with oxygen, acetic acid, sodium chromate, or other compounds to make the respective pigments (U.S. EPA, 1998a; *Hawley's*, 1997; *Ullman's*, 1990). Lead pigments are used because of their rich color quality, excellent opacity, durability, chemical stability, low costs, hiding power, heat resistance, and/or corrosion resistance (U.S. EPA, 1991).

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 2816. Production data was gathered to estimate the total amount of lead in this SIC code. It was assumed that lead oxides and pigments comprise one percent of zinc oxide and other white opaque pigments as measured by pounds of product shipped (Bureau of the Census, 1992). The average amount of lead per facility was calculated by dividing the total estimated amount of lead oxides and pigments (approximately 8 million pounds) by the 25 facilities with more than 10 employees (see Table A-11).

Currently, 17 inorganic pigment facilities report to TRI for lead or lead compounds. An additional eight facilities in SIC 2816 are estimated to submit TRI reports for lead and lead compounds at each of the four lower reporting thresholds. The *de minimis* exemption would not affect the number of additional reports, because the concentration of lead exceeds the current *de minimis* level.

TABLE A-11
SIC 2816: INORGANIC PIGMENTS

Number of facilities [a]	Amount of lead oxide/pigment produced [b] (million lbs)	Average amount of lead per facility (lbs)
25	8.04	321,600

a. The number of facilities in U.S. EPA, 1998a (pp. 6-18,19) was multiplied by the percent of establishments in SIC 2816 that had 10 or more employees (72.3%) (Bureau of the Census, 1996b).
b. It was assumed that lead compounds account for 1% of the quantity of product shipments from Bureau of the Census, 1992, for zinc oxide and other white opaque pigments. This amount was multiplied by the percent of cost of materials for facilities in SIC 2816 with 10 or more employees (98.8%) (Bureau of the Census, 1992).
c. The amount of lead per facility was estimated by dividing the total amount of lead oxide/pigment produced by the number of facilities with 10 or more employees in SIC 2816.

Petroleum Refining (SIC Code 2911)

Lead is a trace constituent in the crude oil processed by petroleum refineries. Lead and lead compounds may also be found in catalytic cracking units, corrosion inhibitors, and gel stabilizers for well plugging (U.S. EPA, 1998d; *Hawley's,* 1997; *Kirk-Othmer,* 1998).

A combination of the Facility-specific Data Method and the Lead Concentration Method was used to estimate the number of lead reports for SIC 2911. Facility-specific crude oil distillation capacity data for 174 of the 179 petroleum refineries in the United States were obtained (U.S. EPA, 1999a). The number of facilities with crude oil capacity data was multiplied by the percent of establishments in SIC 2911 that had 10 or more employees (73%), yielding 127

facilities (Bureau of the Census, 1996b). It was assumed that these 127 facilities had the largest crude oil capacities of the 174 facilities with known capacities, because facilities with a larger number of employees generally have greater production capacities than facilities with a smaller number of employees.

A typical concentration of lead in crude oil is estimated to be 0.31 ppm (Valkovic, 1978).[52] Each of the four lower thresholds was divided by the lead concentration in crude oil to obtain the required throughput to trip each threshold. The required throughput numbers were then compared to the list of facility-specific capacity data to estimate the number of facilities filing additional TRI reports at the lower reporting thresholds. Because capacity data are used instead of operating throughput data, this analysis may slightly overestimate the amount of lead per facility (see tables A-12, and facility-specific information at the end of the Appendix in Table A-49).

Currently, 36 petroleum refining facilities report to TRI for lead or lead compounds. An additional 91 facilities in SIC 2911 are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, and 100-pound thresholds; and additional 90 facilities are estimated to report at the 1,000-pound threshold. If the *de minimis* exemption were in place, no additional reports would be expected, given that the concentration of lead in crude oil is below the current *de minimis* level. However, petroleum refineries may need to report lead from sources other crude oil.

[52]This analysis assumes that the ppm units in Valkovic (1978) are based on weight, not volume.

TABLE A-12
SIC 2911: PETROLEUM REFINING

Lead threshold	Crude oil distillation capacity required per facility [a] (million lbs)	Number of facilities with 10 or more employees [b]	Total crude oil capacity [c] (million lbs)	Estimated total lead [d] (lbs)
Greater than 1 lb	3.2	127		
Greater than 10 lbs	32.3	127		
Greater than 100 lbs	323	127		
Greater than 1,000 lbs	3226	126		
Greater than 10,000 lbs	32258	12		
Greater than 25,000 lbs	80645	0		
			1,963,232	608,602

a. The required crude oil distillation capacity was calculated using an estimate for lead in crude oil (0.31 ppm [weight basis assumed]; Valkovic, 1978).
b. Facility-specific crude oil capacity data for 174 of 179 refineries were obtained from the Sector Facility Indexing Project web site (www.epa.gov/oeca/sfi) based on 1995 data from the National Petroleum Refiners Association and 1996 data from industry. The number of facilities with crude oil capacity data was multiplied by the percent of establishments in SIC 2911 that had 10 or more employees (73.5%) (Bureau of the Census, 1996b) to yield 127 facilities; it was assumed that these facilities had the largest crude oil capacities.
c. This total represents the 127 facilities with the largest crude oil capacities.
d. The estimated concentration of lead in crude oil (0.31 ppm [weight basis assumed]; Valkovic, 1978) was applied to the total crude oil capacity for the 127 facilities with the largest capacities.

Asphalt Paving Mixtures and Blocks (SIC Code 2951)

Emissions of lead and lead compounds from hot-mix asphalt plants may result from aggregate mixing, rotary drying, and asphalt heating. In these processes, lead may be found in asphalt as a trace constituent in the raw material feed or fuel, or it may be released as a result of the practice of burning hazardous waste as a supplemental fuel in the asphalt manufacturing process (U.S. EPA, 1998a).

The Air Emission Factor Method was used to estimate the number of lead reports for SIC 2951. The amount of hot-mix asphalt produced by the industry was assumed to be proportional to the cost of materials for each employment size class (NAPA, 1999; Bureau of the Census, 1992). The only available lead emission factors for asphalt plants were for lead emissions from the rotary dryer (U.S. EPA, 1998a). The total amount of lead for each employment size class was calculated by multiplying asphalt production by an emission factor of 0.012 pounds of lead per million pounds of asphalt produced (U.S. EPA, 1995). This emission factor was the greatest of five emission factors for rotary dryers (all with pollution control devices in place). The greatest emission factor was used because using lead air emissions after pollution control as a proxy for lead use significantly underestimates the amount of lead use. For each employment size class,

the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-13).

Currently, no facilities in this SIC code report to TRI for lead or lead compounds. An additional 942 asphalt plants are estimated to submit TRI reports for lead and lead compounds at the 1-pound threshold, and an additional 26 plants are estimated to report lead and lead compounds at the 10-pound threshold. No asphalt plants are expected to report at the 100- and 1,000-pound thresholds. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Asphalt plants may be able to take advantage of the *de minimis* exemption if the concentration of lead in the aggregate feed, asphalt cement, and fossil fuel are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-13
SIC 2951: ASPHALT PAVING MIXTURES AND BLOCKS

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Hot-mix asphalt produced [d] (million lbs)	Amount of lead [e] (lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	2,658	1,134.6	47.2%	471,748	5,661	2.1
10 to 19	485	422.6	17.6%	175,710	2,109	4.3
20 to 49	325	580.7	24.1%	241,445	2,897	9
50 to 99	106	168.0	7.0%	69,852	838	8
100 to 499	26	99.2	4.1%	41,246	495	19
Total	3,600	2,405.1	100.0%	1,000,000	12,000	

a. Some employee categories were combined because of combined facility data.
b. The number of facilities (3,600) estimated by the National Asphalt Pavement Association (1999) was multiplied by the percent of facilities in each facility size category from Bureau of the Census, 1996a.
c. Bureau of the Census, 1992.
d. National Asphalt Pavement Association, 1999. It was assumed that production was proportional to the cost of materials for each facility size class.
e. The amount of lead was calculated using an air emission factor of 0.012 lb Pb/MMlb of hot-mix asphalt produced; this is the greatest of five emission factors (all with control devices) provided by U.S. EPA, 1995a. Because total lead use is greater than lead emitted to air (especially after controls), this method underestimates the amount of total lead.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Cement, Hydraulic (SIC Code 3241)

Lead and lead compounds may be emitted from process kilns and clinker grinders in cement manufacturing plants. Cement plants transform raw materials into clinkers (gray, hard, spherical intermediate products) that are then converted into finished Portland cement. Lead is expected to be present as a trace contaminant in raw material inputs, including silicon,

aluminum, and/or iron (U.S. EPA, 1998a). Lead may be also emitted from fossil fuels, or as a result of the practice of burning hazardous waste as a supplemental fuel.

A combination of the Facility-specific Data Method and the Air Emission Factor Method was used to estimate the number of lead reports for SIC 3241. Facility-specific clinker production capacity data for 131 dry and 71 wet process kilns (active) were obtained (U.S. EPA, 1998a). The number of facilities (for both dry and wet kilns) was multiplied by the percent of establishments in SIC 3241 that had 10 or more employees (67.1%), yielding 88 dry and 48 wet process facilities (Bureau of the Census, 1996b). It was assumed that these facilities had the largest clinker production capacities, because facilities with a larger number of employees generally have greater production capacities than facilities with a smaller number of employees.

Each of the four lower thresholds was divided by a lead air emission factor to obtain the required throughput to trip each threshold (U.S. EPA, 1998a). The lead air emission factor combined emission factors from the process kiln and clinker grinder, both without pollution control devices. For dry process kilns, an emission factor of 80 pounds of lead per million pounds of clinker produced was used; for wet process kilns, an emission factor of 60 pounds of lead per million pounds of clinker produced was used. The required throughput numbers were then applied to the list of facility-specific capacity data to estimate the number of facilities filing additional TRI reports at the lower reporting thresholds. Although the use of capacity data would tend to overestimate lead amounts, this bias is more than offset by the use of an air emissions factor (see Tables A-14a and A-14b, and facility-specific information at the end of the Appendix in Table A-50).

Currently, 13 facilities in this SIC code report to TRI for lead or lead compounds. An additional 123 facilities in SIC 3241 are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, 100-, and 1,000-pound thresholds. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Cement plants may be able to take advantage of the *de minimis* exemption if the concentration of lead in the raw material and fossil fuel inputs are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-14a
SIC 3241: CEMENT, HYDRAULIC
FOR DRY PROCESS KILNS

Lead threshold	Clinker production required per facility [a] (million lbs)	Number of facilities with 10 or more employees [b]	Total clinker capacity [c] (million lbs)	Estimated total lead [d] (million lbs)
Greater than 1 lb	0.013	88		
Greater than 10 lbs	0.125	88		
Greater than 100 lbs	1.25	88		
Greater than 1,000 lbs	12.5	88		
Greater than 10,000 lbs	125	88		
Greater than 25,000 lbs	313	88		
			95,678	7.7

a. The required clinker production was calculated using a combined air emission factor from the process kiln and clinker grinding, both without control devices (U.S. EPA, 1998a, p. 5-127). Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
b. Facility-specific clinker production capacity data for 131 dry process kilns and 71 wet process kilns were obtained from U.S. EPA, 1998a (Chap. 5). The number of kilns was multiplied by the percent of establishments in SIC 3241 that had 10 or more employees (67.1%) (Bureau of the Census, 1996b), yielding 88 and 48 facilities for dry and wet kilns, respectively. It was assumed that these facilities had the largest clinker production capacities.
c. The total clinker capacity represents the 88 dry and 48 wet kilns with the largest clinker production capacities.
d. The estimated total lead was calculated by multiplying the total clinker capacity by an emission factor (80 lbs/MMlbs clinker produced for dry kilns; 60 lbs/MMlbs clinker produced for wet kilns) for process kiln and clinker grinding, both without control devices (U.S. EPA, 1998a, p. 5-127).

TABLE A-14b
SIC 3241: CEMENT, HYDRAULIC
FOR WET PROCESS KILNS

Lead threshold	Clinker production required per facility (million lbs)	Number of facilities with 10 or more employees [b]	Total clinker capacity [c] (million lbs)	Estimated total lead [d] (million lbs)
Greater than 1 lb	0.017	48		
Greater than 10 lbs	0.167	48		
Greater than 100 lbs	1.67	48		
Greater than 1,000 lbs	16.7	48		
Greater than 10,000 lbs	167	48		
Greater than 25,000 lbs	417	48		
			39,410	2.4

a. The required clinker production was calculated using a combined air emission factor from the process kiln and clinker grinding, both without control devices (U.S. EPA, 1998a, p. 5-127). Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
b. Facility-specific clinker production capacity data for 131 dry process kilns and 71 wet process kilns were obtained from U.S. EPA, 1998a (Chap. 5). The number of kilns was multiplied by the percent of establishments in SIC 3241 that had 10 or more employees (67.1%) (Bureau of the Census, 1996b), yielding 88 and 48 facilities for dry and wet kilns, respectively. It was assumed that these facilities had the largest clinker production capacities.

Blast Furnaces and Steel Mills (SIC Code 3312)

Lead is a trace contaminant in base or alloyed steel and in coal used for coke production at iron and steel mills (*Ullman's*, 1990; U.S. EPA, 1998a). Lead may also be a trace constituent in scrap metal feed used in steelmaking.

The Lead Concentration Method was used to estimate the number of lead reports from SIC 3312. This analysis assumes that all facilities in SIC 3312 produce steel with the limiting (i.e., maximum allowable) concentration of lead. For this analysis, trace lead in steel is used as an estimate of the amount of lead and lead compound use in iron and steel mills. This estimate is a minimum estimate because there could be other uses of lead. For example, the amount of lead use from coke manufacturing in SIC 3312 could not be determined due to lack of data. However, while the National Air Pollutant Emission Trends Update reported zero lead emissions from coke manufacturing in 1997, lead is likely to be processed as a trace contaminant in the raw material feed (U.S. EPA, 1998b). Therefore, this analysis may underestimate the amount of lead use in iron and steel mills.

Because the available data did not differentiate between base steel which contains lead versus base steel which does not contain lead, this analysis uses only lead in alloyed steel as a minimum estimate of lead and lead compound use in SIC 3312. The amount of alloyed steel produced by the industry was assumed to be proportional to the cost of materials for each employment size class (Bureau of the Census, 1996a; Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the alloyed steel production by the limiting (i.e., upper-limit) concentration of lead in base or alloyed steel (0.40%) (*Ullman's*, 1990). For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-15.

Currently, 86 facilities in this SIC code report to TRI for lead or lead compounds. An additional 185 iron and steel mills are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Even though the assumed concentration of lead in steel is above the current *de minimis* level, iron and steel mills may be able to take advantage of the *de minimis* exemption if the concentrations of lead in steel and fossil fuel are actually below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-15
SIC 3312: BLAST FURNACES AND STEEL MILLS

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Amount of lead [d] (lbs)	Average amount of lead per facility [e] (lbs)
1 to 9	208	17.8	0.1%	59,246	285
10 to 19	41	17.1	0.1%	56,916	1,388
20 to 49	42	92.1	0.4%	306,548	7,299
50 to 99	31	313.6	1.2%	1,043,794	33,671
100 to 249	41	1,380.3	5.4%	4,594,223	112,054
250 to 499	55	3,426.2	13.5%	11,403,845	207,343
500 to 999	24	3,740.6	14.7%	12,450,302	518,763
1,000 or more	37	16,404.5	64.6%	54,601,126	1,475,706
Total	479	25,392.2	100.0%	84,516,000	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992. Cost of materials was assumed to be proportional to the number of facilities within each facility size class.
d. Alloyed steel production (10,564,500 short tons; Bureau of the Census, 1996a) was multiplied by the limiting concentration of lead in base or alloy steel (0.40%; Ullman's, 1994) to obtain the amount of total lead. It was assumed that the amount of lead was proportional to the cost of materials for each facility size class. It was also assumed that all facilities produce steel with lead at the limiting concentration.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Electrometalurgical Products – Ferroalloys (SIC Code 3313)

Facilities that manufacture ferroalloys may process lead that is present as a trace contaminant in raw material feed. The National Air Pollutant Emission Trends Update reported total lead air emissions of 12,000 pounds from ferroalloy manufacturers in 1997 (U.S. EPA, 1998b).

The Sector Air Emissions Method was used to estimate the number of lead reports from SIC 3313. It was assumed that total lead air emissions were proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total air emissions by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-16).

Currently, 5 facilities in this SIC code report to TRI for lead or lead compounds. An additional 24 electrometallurgical plants are estimated to submit TRI reports for lead and lead compounds at the 1- and 10-pound thresholds, and an additional 15 plants are estimated to report

at the 100-pound threshold. No electrometallurgical plants are expected to report at the 1,000-pound threshold. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Electrometallurgical plants may be able to take advantage of the *de minimis* exemption if the concentration of lead in the raw material and fossil fuel inputs are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-16
SIC 3313: ELECTROMETALLURGICAL PRODUCTS (FERROALLOYS)

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Amount of lead [d] (lbs)	Average amount of lead per facility [e] (lbs)
1 to 9	4	4.7	0.6%	69	17
10 to 19	3	5.2	0.6%	76	25
20 to 49	6	13.0	1.6%	191	32
50 to 99	5	57.9	7.1%	850	170
100 to 249	11	363.4	44.5%	5,338	485
250 to 999	4	372.8	45.6%	5,476	1,369
Total	33	817.0	100.0%	12,000	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b. It was assumed that all facilities use lead in the production of ferroalloys.
c. Bureau of the Census, 1992.
d. U.S. EPA, 1998b (National Air Pollutant Emission Trends Update, 1997). It was assumed that air emissions were proportional to the cost of materials for each facility size class. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Iron Foundries (SIC Codes 3321, 3322)

Iron foundries manufacture iron castings from molten iron, scrap metal, carbon, and various alloying agents. The amount of lead and lead compounds processed by iron foundries depends mainly on the concentration of lead in the scrap metal feed (U.S. EPA, 1998a).

The Air Emission Factor Method was used to estimate the number of lead reports for SIC 3321 and 3322. The first step was to obtain a total amount of iron castings produced (SIC 3321 and 3322 combined). To determine the amount of iron castings produced in each SIC code, it was assumed that the amount of production for each SIC code was proportional to the cost of materials for each SIC code. Using available cost of materials data for each four-digit SIC code, the amount of iron castings produced for each SIC code was calculated. It was also assumed that

production within each SIC code was assumed to be proportional to the cost of materials for each employment size class (USGS, 1999b; Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the production of iron castings by an emission factor of 400 pounds of lead per million pounds of iron produced (U.S. EPA, 1998a). This emission factor is a weighted average of the emission factors for a cupola (70%), reverberatory furnace (15%), and electric arc furnace (15%), all without pollution control devices.[53] For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Tables A-17 and A-18).

Currently, 20 facilities in SIC 3321 and 2 facilities in SIC 3322 report to TRI for lead or lead compounds. An additional 485 iron foundries are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds. Of these 485 foundries, 472 are gray and ductile iron foundries in SIC 3321; the remaining 13 are malleable iron foundries in SIC 3322. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Iron foundries may be able to take advantage of the *de minimis* exemption if the concentration of lead in the scrap metal and fossil fuel inputs are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

[53]Seventy percent of iron castings are produced using cupolas; the remaining 30 percent was divided evenly between reverberatory and electric arc furnaces (U.S. EPA, 1997b).

TABLE A-17
SIC 3321: GRAY AND DUCTILE IRON FOUNDRIES

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Amount of iron castings produced [d] (million lbs)	Emission factor [e] (lbs Pb/ million lbs)	Amount of lead [e] (lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	159	27.1	0.8%	157	400	62,827	395
10 to 19	67	35.2	1.0%	204	400	81,606	1,218
20 to 49	135	149.6	4.3%	867	400	346,824	2,569
50 to 99	101	241.1	6.9%	1,397	400	558,952	5,534
100 to 249	104	669.4	19.2%	3,880	400	1,551,897	14,922
250 to 499	49	741.3	21.3%	4,296	400	1,718,585	35,073
500 to 999	28	696.2	20.0%	4,035	400	1,614,028	57,644
1,000 or more	8	923.8	26.5%	5,354	400	2,141,682	267,710
Total	651	3,483.7	100.0%	20,191		8,076,400	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1999b. It was assumed that production was proportional to the cost of materials for each facility size class.
e. The amount of lead was calculated using an air emission factor of 400 lb Pb/MMlb iron produced; this is a weighted average of the emission factors for cupola (70%), reverb. furnace (15%), and electric induction furnace (15%), all without control devices. U.S. EPA, 1998a, p. 4-58). (The 70% figure from U.S. EPA, 1997b; the remaining 30% divided equally among remaining emission factors.) The maximum emission factor within a given range was used. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

TABLE A-18
SIC 3322: MALLEABLE IRON FOUNDRIES

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total	Amount of iron castings produced [d] (million lbs)	Emission factor [e] (lbs Pb/ million lbs)	Amount of lead [e] (lbs)	Average amount of lead per facility [f] (lbs)
1 to 9	11	0.4	0.2%	2	400	869	79
10 to 19	1	1.1	0.5%	6	400	2,596	2,596
20 to 99	8	12.0	4.9%	70	400	27,813	3,477
100 to 2,499	6	231.4	94.5%	1,341	400	536,322	89,387
Total	26	244.9	100.0%	1,419		567,600	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1999b. It was assumed that production was proportional to the cost of materials for each facility size class.
e. The amount of lead was calculated using an air emission factor of 400 lb Pb/MMlb iron produced; this is a weighted average of the emission factors for cupola (70%), reverb. furnace (15%), and electric induction furnace (15%), all without control devices. U.S. EPA, 1998a, p. 4-58). (The 70% figure from U.S. EPA, 1997b; the remaining 30% divided equally among remaining emission factors.) The maximum emission factor within a given range was used. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
f. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Steel Foundries (SIC Code 3324, 3325)

Steel foundries manufacture steel castings from molten iron, scrap metal, carbon, and various alloying agents. The amount of lead and lead compounds processed by steel foundries depends mainly on the amount of lead in the scrap metal feed (U.S. EPA, 1998a).

The Sector Air Emissions Method was used to estimate the number of lead reports for SIC 3324 and 3325. The first step was to obtain a total amount of steel castings produced (SIC 3324 and 3325 combined). To determine the amount of steel castings produced in each SIC code, it was assumed that total lead air emissions for each SIC code was proportional to the cost of materials for each SIC code. Using available cost of materials data for each four-digit SIC code, the total lead air emissions for each SIC code was calculated. It was also assumed that total lead emissions within each SIC code was assumed to be proportional to the cost of materials for each employment size class (USGS, 1999b; Bureau of the Census, 1992).

The National Air Pollutant Emission Trends Update reported total lead air emissions of 338,000 pounds for steel foundries in 1997 (U.S. EPA, 1998b). This analysis assumes that total lead air emissions were proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total air emissions by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility

was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Tables A-19 and A-20).

Currently, 1 facility in SIC 3324 and 8 facilities in SIC 3325 report to TRI for lead or lead compounds. An additional 340 steel foundries are estimated to submit TRI reports for lead and lead compounds at the 1- and 10-pound thresholds. An additional 328 plants are estimated to report at the 100-pound threshold, and 87 plants are estimated to report at the 1,000-pound threshold. The breakdown between steel investment foundries (SIC 3324) and steel foundries, not elsewhere classified (SIC 3325) is shown in Table A-21. If the *de minimis* exemption were not eliminated, the number of additional reports may be reduced. Steel foundries may be able to take advantage of the *de minimis* exemption if the concentration of lead in the scrap metal and fossil fuel inputs are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities.

TABLE A-19
SIC 3324: STEEL INVESTMENT FOUNDRIES

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	21	4.4	0.7%	1,045	50
10 to 19	12	4.8	0.8%	1,140	95
20 to 49	37	22.4	3.7%	5,322	144
50 to 99	26	52.5	8.7%	12,473	480
100 to 249	29	116.5	19.2%	27,678	954
250 to 499	9	79.9	13.2%	18,982	2,109
500 to 999	6	147.8	24.4%	35,114	5,852
1,000 to 2,499	5	177.4	29.3%	42,146	8,429
Total	145	605.7	100.0%	143,900	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. U.S. EPA, 1998b (National Air Pollutant Emission Trends Update, 1997). It was assumed that air emissions were proportional to the cost of materials for each facility size class. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

TABLE A-20
SIC 3325: STEEL FOUNDRIES, N.E.C.

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	92	8.9	1.1%	2,113	23
10 to 19	33	45.5	5.6%	10,804	327
20 to 49	82	63.6	7.8%	15,102	184
50 to 99	34	66.0	8.1%	15,672	461
100 to 249	45	314.1	38.4%	74,586	1,657
250 to 499	22	225.4	27.6%	53,524	2,433
500 to 2,499	9	93.9	11.5%	22,298	2,478
Total	317	817.4	100.0%	194,100	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. U.S. EPA, 1998b (National Air Pollutant Emission Trends Update, 1997). It was assumed that air emissions were proportional to the cost of materials for each facility size class. Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

TABLE A-21
SUMMARY OF ESTIMATED ADDITIONAL REPORTS FOR STEEL FOUNDRIES

SIC Code and Name	Number of Facilities			
	> 1 lb	> 10 lbs	> 100 lbs	> 1000 lbs
3324 – Steel investment foundries	123	123	111	19
3325 – Steel foundries, not elsewhere classified	217	217	217	68
TOTAL	**340**	**340**	**328**	**87**

Secondary Smelting and Refining of Nonferrous Metals (SIC Code 3341)

SIC 3341 consists of secondary smelting and refining facilities for various nonferrous metals, including lead, copper, aluminum, antimony, gold, mangnesium, nickel, silver, tin, and zinc. The following subsections present estimated number of lead reports for secondary lead, copper, and aluminum smelting. Copper and aluminum smelting are combined because the same approach to estimate number of reports was used for both sectors.

Secondary lead smelting

Secondary lead smelters produce lead and lead alloys by reclaiming scrap lead, mainly from used automobile batteries. Secondary lead smelters produced 1,892 million pounds of refined lead in 1990, about 69 percent of the total refined lead (USGS, 1998a).

The Lead Production/Consumption Method was used to estimate the number of lead reports for secondary lead smelters. Seventeen of the 29 plants in the United States accounted for more than 98 percent of the total secondary lead production (USGS, 1999a). These 17 plants were placed in a "major" facility size category. The remaining twelve plants were placed in a "minor" facility size category. The average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

It is calculated that all secondary lead smelters already report for lead and lead compounds to TRI because of the high volumes of lead produced; therefore, no additional reports are expected. The *de minimis* exemption would not affect the number of additional reports, because lead is manufactured.

Secondary copper and aluminum smelting

Secondary copper smelters and secondary aluminum smelters process scrap metals to recover refined copper and aluminum, respectively. Lead emissions from secondary copper and aluminum smelters depend on the lead content of the scrap metal feed.

The Air Emission Factor Method was used to estimate the number of lead reports for secondary lead smelters. The total amount of lead for each sector was calculated by multiplying the amounts of secondary copper and aluminum produced by their respective emission factors (USGS, 1999c). The emission factor used for secondary copper smelting was 25,000 pounds of lead per million pounds of copper produced (U.S. EPA, 1998a). This air emission factor was the greatest of three emission factors given for reverberatory furnaces in secondary copper smelters. The emission factor used for secondary aluminum smelting was 11.5 pounds of lead per million pounds of aluminum produced (U.S. EPA, 1998a). This air emission factor is the sum of the greatest emission factor for the burning/drying step and the emission factor for the reverberatory furnace, both with pollution control devices.[54] The average amount of lead per facility was calculated by dividing the amount of lead by the number of facilities with 10 or more employees (see Table A-22).

Because of the high volume of secondary copper produced, it is calculated that all secondary copper smelters already report for lead and lead compounds to TRI at the current thresholds; therefore, no additional reports are expected. An additional 11 secondary aluminum

[54]The emission factor for the burning/drying step was the greatest of three emission factors (all with pollution control devices) for this process step. The greatest emission factor was used due to the fact that using lead air emissions after pollution control as a proxy for lead use significantly underestimates the amount of lead use.

smelters are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, and 100-pound thresholds. No smelters are expected to report at the 1,000-pound threshold. The *de minimis* exemption would not affect the number of additional reports for either sector, because the concentration of lead in the scrap metal feed is likely to exceed the current *de minimis* level.

TABLE A-22
SIC 3341: SECONDARY SMELTING AND REFINING OF NONFERROUS METALS

Secondary lead smelting:

Facility size [a]	Number of facilities [a]	Lead produced [b] (million lbs)	Average amount of lead produced per facility [c] (million lbs)
Major	17	2,226	130.9
Minor	3	11	3.7
Total	20	2,237	

Secondary aluminum smelting:

Number of facilities [d]	Total aluminum produced [e] (million lbs)	Amount of lead [f] (lbs)	Average amount of lead per facility (lbs)
53	3,207	36,881	696

Secondary copper smelting:

Number of facilities [g]	Total copper produced [h] (million lbs)	Amount of lead [i] (million lbs)	Average amount of lead per facility (million lbs)
2	620	16	8

a. USGS, 1999a. 17 of the 29 plants accounted for more than 98% of the total secondary lead production. The 29 plants were multiplied by the number of establishments in SIC 3341 that have 10 or more employees (69.2%) (Bureau of the Census, 1996b), yielding 20 plants. It was assumed that all 17 of the major plants have 10 or more employees; the remaining 3 plants are minor.

b. USGS, 1999a. The total secondary lead from minor plants (2% of total production) was divided equally among the 12 minor plants. The amount in the table for minor plants represents the production from the 3 minor plants assumed to have 10 or more employees.

c. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

d. U.S. EPA, 1998g presents 76 smelters (citing USGS, 1997, and the Aluminum Association, 1997). Multiplying this by the percent of facilities in SIC 3341 with 10 or more employees (69.2%) (Bureau of the Census, 1996b) yields 53 smelters.

e. USGS, 1999e. This amount was multiplied by the percent of cost of materials for facilities in SIC 3341 with 10 or more employees (96.9%) (Bureau of the Census, 1996b).

f. The amount of lead was calculated using a combined air emission factor from two process steps, both with control devices (the greatest emission factor was used from the burning/drying step)(11.5 lbs/MMlbs aluminum produced; U.S. EPA, 1998a, p. 4-51). Because total lead use is greater than lead emitted to air (especially after controls), this method underestimates the amount of total lead.

g. The number of facilities in USGS, 1999d, was multiplied by the percent of establishments in SIC 3341 that had 10 or more employees (69.2%) (Bureau of the Census, 1996b).

h. USGS, 1999 (Mineral Commodity Summaries - Copper). This amount was multiplied by the percent of cost of materials for facilities in SIC 3341 with 10 or more employees (96.9%) (Bureau of the Census, 1992).

i. The amount of lead was calculated using an air emission factor with no control device (the greatest emission factor was used) (25,000 lbs/MMlbs copper produced; U.S. EPA, 1998a, p. 4-37). Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.

Copper Rolling and Drawing – Brass and Bronze (SIC Code 3351)

Brass (copper-zinc) and bronze (copper-tin) alloys often incorporate other metals, including nickel and lead, to modify the alloy's physical characteristics. In particular, lead improves the manipulability of brass and bronze (U.S. EPA, 1991). Brass and bronze alloys may incorporate lead as an intended component or as a trace contaminant; the amount of lead depends on the alloy composition, furnace and fuel type, smelting temperature, and other operating parameters (U.S. EPA, 1998a). It is likely that the lead is processed or manufactured as a byproduct in the production of brass and bronze.

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 3351. There are 126 facilities in SIC 3351. It is assumed that all of them use lead in the production of brass and bronze. If the actual number of facilities in SIC 3351 that process lead in their operations is lower, the average amount of lead per facility for each employment size class would increase.

The U.S. Geological Survey reported total lead consumption of 9,724,000 pounds for brass and bronze smelters in 1997 (USGS, 1998a). This analysis assumes that total lead consumption was proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total lead consumption by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-23).

Currently, 15 facilities in SIC 3351 report to TRI for lead or lead compounds. An additional 85 facilities in SIC 3351 are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds. If the *de minimis* exemption were not eliminated, the number of additional reports for facilities producing bronze alloys without significant levels of lead may be reduced. Bronze smelters may be able to take advantage of the *de minimis* exemption if the concentration of lead in the raw material and fossil fuel inputs are below *de minimis* levels. However, these facilities would not be able to take advantage of the *de minimis* exemption if lead and lead compounds are manufactured as a by-product during combustion or other high-temperature activities. The *de minimis* exemption would not apply to the rest of the brass and bronze smelters, because the concentration of lead exceeds the current *de minimis* level.

TABLE A-23
SIC 3351: COPPER ROLLING AND DRAWING
(BRASS AND BRONZE)

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	26	13.5	0.3%	29,257	1,125
10 to 19	7	5.5	0.1%	11,919	1,703
20 to 49	18	132.0	2.9%	286,064	15,892
50 to 99	24	206.0	4.6%	446,433	18,601
100 to 249	27	1,322.2	29.5%	2,865,405	106,126
250 to 499	16	1,581.3	35.2%	3,426,914	214,182
500 to 2,499	8	1,226.5	27.3%	2,658,009	332,251
Total	126	4,487.0	100.0%	9,724,000	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class. It was also assumed that all facilities use lead.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Small Arms Ammunition (SIC Code 3482)

Lead is used in ammunition because of its high density, which allows a bullet to maintain trajectory and velocity. The concentration of lead in ammunition is typically 99.7 to 99.9 percent (U.S. EPA, 1991). In 1997, 122 million pounds of lead were consumed for ammunition, most of it from secondary (recycled) lead (USGS, 1998a). However, "green bullets" containing tungsten instead of lead are being developed; the overall goal is to replace all leaded bullets in the U.S. armed services (which consume only a portion of all bullets) by 2003 (Stone, 1999).

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 3482. The total lead consumption for the sector was assumed to be proportional to the cost of materials for each employment size class (USGS, 1998a; Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total lead consumption by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-24).

Currently, 14 facilities in SIC 3482 report to TRI for lead or lead compounds. An additional 18 facilities in SIC 3482 are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds. The *de minimis* exemption would not affect the

number of additional reports, because the concentration of lead in bullets exceeds the current *de minimis* level.

TABLE A-24
SIC 3482: SMALL ARMS AMMUNITION

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (million lbs)	Amount of lead [d] (million lbs)	Average amount of lead per facility [e]
1 to 9	75	5.5	1.4%	1.7	0.022
10 to 19	12	4.8	1.2%	1.5	0.12
20 to 49	9	3.3	0.8%	1.0	0.11
50 to 99	2	9.0	2.3%	2.8	1.4
100 to 499	4	125.9	31.7%	39	9.7
500 to 2,499	5	249.2	62.7%	76	15
Total	107	397.7	100.0%	122	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Electronic Components and Accessories (SIC Code 367)

Electronic component and accessory manufacturers use lead in a wide variety of applications: solder, flux, printed circuit board manufacturing, ferroelectric materials, piezoelectric ceramics, electroplating, semiconductors, photoconductive cells, thermoelectric devices, photodetectors, cable coverings, and capacitors. While lead is important to all of these applications, the lead content may vary significantly. In applications like solder, piezoelectric ceramics, and cable coverings, lead can be one of the main components, while in other applications, lead may be present in smaller quantities (U.S. EPA, 1998a). Lead is commonly used in solder, electroplating, and printed circuit board manufacturing because of its low melting point, good electrical conductivity, aggressive bonding capabilities, low cost, and ability to minimize component damage due to vibration. Lead is used in cable coverings because of its extrudability, flexibility, and corrosion resistance (U.S. EPA, 1991; 1998a).

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 367. There are a total of 6,570 facilities in this SIC code. It is assumed that all of these facilities use lead in the production of electronic components and accessories. Because of the wide variety of uses, there is likely to be a greater variance in per facility lead use within SIC 367 than that which this analysis estimates (i.e., facilities with the same cost of materials may produce different products with vastly different amounts of lead).

The U.S. Geological Survey reported total lead consumption of 4,168,000 pounds for this sector in 1997 (USGS, 1998a). This analysis assumes that total lead consumption was proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total lead consumption by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see table A-25).

Currently, 71 facilities in SIC 367 report to TRI for lead or lead compounds. An additional 4,033 facilities in SIC 367 are estimated to submit TRI reports for lead and lead compounds at the 1- and 10-pound thresholds. An additional 3,109 plants are estimated to report at the 100-pound threshold, and 405 plants are estimated to report at the 1,000-pound threshold. If the *de minimis* exemption were not eliminated, the number of additional reports is not likely to change, because the concentration of lead in various applications exceed the current *de minimis* level.

TABLE A-25
SIC 367: ELECTRONIC COMPONENTS AND ACCESSORIES

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	2,466	361.7	1.2%	51,406	21
10 to 19	924	435.5	1.5%	61,895	67
20 to 49	1,240	1,363.5	4.6%	193,787	156
50 to 99	799	2,022.3	6.9%	287,418	360
100 to 249	665	4,490.0	15.3%	638,139	960
250 or more	476	20,653.4	70.4%	2,935,354	6,240
Total	6,570	29,326.4	100.0%	4,168,000	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b. It was assumed that all facilities use lead in one or more of the following applications: solder, flux, ferroelectric materials, piezoelectric ceramics, electroplating, semiconductors, photoconductive cells, thermoelectric devices, photodetectors, and capacitors.
c. Bureau of the Census, 1992.
d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Storage Battery Manufacturing (SIC Code 3691)

The manufacturing of batteries is the largest lead-consuming process in the United States, accounting for 87 percent of lead consumption in 1997. Lead compounds are used in batteries because of resistance to corrosiveness of sulfuric acid and low cost (USGS, 1998a). In lead-acid storage batteries, the structural grids and terminal posts are manufactured with lead alloys, while lead oxide paste is used to make the charge-carrying plates (U.S. EPA, 1998a).

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 367. The U.S. Geological Survey reported total lead consumption of three billion pounds for storage battery manufacturing in 1997 (USGS, 1998a). This analysis assumes that total lead consumption was proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total lead consumption by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-26).

Currently, 75 facilities in SIC 3691 already report to TRI for lead because their lead use exceeds current thresholds. An additional 23 facilities in SIC 3691 are estimated to submit TRI reports for lead and lead compounds at each of the four thresholds. The *de minimis* exemption would not affect the number of additional reports, because the concentrations of lead exceed the current *de minimis* level.

TABLE A-26
SIC 3691: STORAGE BATTERY MANUFACTURING

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (million lbs)	Amount of lead [d] (million lbs)	Average amount of lead per facility [e]
1 to 9	43	10.4	0.6%	19.5	0.45
10 to 19	8	10.7	0.7%	20.1	2.51
20 to 49	16	29.1	1.8%	54.6	3.41
50 to 99	16	79.8	4.9%	149.7	9.36
100 to 249	25	350.1	21.4%	657	26.3
250 to 499	28	959.2	58.7%	1,800	64.3
500 to 2,499	5	194.1	11.9%	364	72.8
Total	141	1,633.4	100.0%	3,065	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b.
c. Bureau of the Census, 1992.
d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Motor Vehicles and Motor Vehicle Equipment (SIC Code 371)

Motor vehicle and motor vehicle equipment manufacturers use lead in a wide variety of applications: bearing metals, casting metals, terne metal, wear-resistant shock absorbers, solder, automotive coverings, and air bag propellants (U.S. EPA, 1998a). When lead is alloyed with other metals, lead alloys produce a combination of desired properties related to friction, wear, compatibility, fatigue, compressive strength, and corrosion resistance. Lead alloys are used in bearing metals, shock absorbers, and brake linings (Kirk-Othmer, 1998). Terne metal (a lead alloy laminated onto a steel sheet) is primarily used in gas tanks because it is corrosion-resistant, even when dented (U.S. EPA, 1991). This analysis assumes that storage batteries used in motor vehicles and motor vehicle equipment covered by the article exemption, and are not included in the estimates of lead consumption.

The Lead Production/Consumption Method was used to estimate the number of lead reports for SIC 371. There are a total of 5,049 facilities in this SIC code. It is assumed that all of these facilities use lead in the production of motor vehicles and motor vehicle equipment. Because of the wide variety of uses, there is likely to be a greater variance in per facility lead use within SIC 371 than that which this analysis estimates (i.e., facilities with the same cost of materials may produce different products with vastly different amounts of lead).

The U.S. Geological Survey reported total lead consumption of 4,079,000 pounds for this sector in 1997 (USGS, 1998a). This analysis assumes that total lead consumption was proportional to the cost of materials for each employment size class (Bureau of the Census, 1992). The total amount of lead for each employment size class was calculated by multiplying the total lead consumption by the percent of cost of materials for that employment size class. For each employment size class, the average amount of lead per facility was calculated by dividing the amount of lead corresponding with that size class by the number of facilities in that class (see Table A-27).

Currently, 97 facilities in SIC 371 report to TRI for lead or lead compounds. An additional 2,862 facilities in SIC 371 are estimated to submit TRI reports for lead and lead compounds at the 1- and 10-pound thresholds. An additional 1,485 plants are estimated to report at the 100-pound threshold, and 201 plants are estimated to report at the 1,000-pound threshold. If the *de minimis* exemption were not eliminated, it is not likely to affect the number of additional reports, because the concentrations of lead in various applications in SIC 371 exceed the current *de minimis* level.

TABLE A-27
SIC 371: MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	2,090	610.4	0.4%	15,666	8
10 to 19	649	739.5	0.5%	18,980	29
20 to 49	728	1,702.4	1.1%	43,693	60
50 to 99	442	2,272.5	1.4%	58,325	132
100 to 249	530	7,344.8	4.6%	188,509	356
250 to 499	312	9,319.8	5.9%	239,199	767
500 or more	298	136,938.8	86.2%	3,514,627	11,800
Total	5,049	158,928.2	100.0%	4,079,000	

a. Some employee categories were combined because of combined facility data.
b. Bureau of the Census, 1996b. It was assumed that all facilities use lead in one or more of the following applications: bearing metals, casting metals, terne metal, wear-resistant shock absorbers, automotive coverings, and air bag propellants.
c. Bureau of the Census, 1992.
d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class.
e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

Commercial Hazardous Waste Treatment (SIC Code 4953)

To estimate the number of commercial hazardous waste treatment facilities that may report on lead and lead compounds at lower reporting thresholds, data on off-site transfers from TRI facilities in 1996 were used. The TRI data have certain limitations when used for this purpose. First, TRI data may underestimate the *number of reporting facilities* because TRI-subject hazardous waste facilities that receive wastes only from non-TRI facilities would not appear in TRI. Second, the TRI data may underestimate the *amount of the chemical* because it does not include transfers that the hazardous waste facility may receive from non-TRI facilities, or transfers from TRI facilities for chemicals that did not exceed current reporting thresholds.

Therefore, for this analysis, each facility was assumed to represent two facilities, and the amount transferred was doubled to account for additional quantities not captured under current TRI reporting. Although the first year of TRI reporting has not yet been received from this sector, based on available information it appears that 60 facilities will report on lead or lead compounds at current thresholds. An additional 80, 74, 64, and 36 facilities are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, 100-, and 1,000-pound thresholds, respectively (see Table A-28, and facility-specific information presented at the end of the Appendix in Table A-51).

TABLE A-28
SIC 4953: REFUSE SYSTEMS

Threshold	Estimated number of lead reports		
	Total number of reports (current + additional)	Current number of reports	Additional number of reports
1 lb	140	60	80
10 lbs	134	60	74
100 lbs	124	60	64
1,000 lbs	96	60	36
10,000 lbs	60	60	0
25,000 lbs	54	54	0

Petroleum Bulk Stations and Terminals (SIC Code 5171)

Petroleum bulk stations and bulk terminals process lead as a trace constituent in crude oil, No. 2 distillate fuel oil, No. 6 residual fuel oil, gasoline, and aviation gas (U.S. EPA, 1997a). The approach used to estimate the number of petroleum bulk stations and terminals that may submit additional TRI reports for lead and lead compounds at a lower reporting threshold were estimated by the following procedure:

- Select a typical lead concentration in each of the petroleum products;Determine the percentage of total reportable facilities (i.e., ten or more employees) handling each petroleum product containing a trace lead constituent;Using six model facilities for bulk stations and terminals, determine the amount of lead through each model facility by petroleum product;Apply the percentage of facilities handling each petroleum product to the number of facilities represented by each model;For each model, determine the minimum number of facilities expected to submit a report at each threshold by assuming a single facility handles all petroleum products with a trace lead constituent (i.e., if a model exceeds a reporting threshold for crude, No. 2, and No. 6 fuel oil, one facility would submit a single report which accounts for the lead present in all three petroleum products);For each model, determine the maximum number of facilities expected to submit a report at each threshold by assuming a single facility only handles one petroleum product with a trace lead constituent (i.e., if a model exceeds a reporting threshold for crude, No. 2, and No. 6 fuel oil, three separate facilities would submit additional reports for lead); andDetermine the total number of facilities expected to report at each lower reporting threshold by adding the results for each model facility.

Typical concentrations of lead are 0.31 ppm in crude oil, 0.5 ppm in No. 2 fuel oil, 1 ppm in No. 6 fuel oil, 0.079 ppm in gasoline, and 1,750 ppm in aviation gas (all based on weight) (Valkovic, 1978; U.S. EPA, 1998a; ASTM, 1997). These concentrations are below the current *de minimis* concentration for lead and lead compounds; however, under the proposed lead rule, facilities will not be able to take advantage of the *de minimis* exemption for the processing or otherwise using of lead in mixtures and trade name products.

According to the *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*, there are 3,842 facilities in SIC 5171 subject to TRI reporting (i.e., have 10 or more employees) (U.S. EPA, 1997a). Each bulk station or terminal may not handle all petroleum products. An analysis of 309 facilities in SIC 5171 reported the estimated percentage of total facilities handling each petroleum product: 32 percent handle No. 6 fuel oil; 13 percent handle crude oil; and 55 percent handle No. 2 fuel oil. The 2,113 facilities (55% × 3,842) handling No. 2 fuel oil may or may not also handle No. 6 fuel oil and crude oil. If the 2,113 facilities handle all three products, the number of facilities subject to TRI reporting for lead at a lower threshold and *de minimis* concentration would be 2,113 facilities. However, if each product is handled by separate facilities, 2,113 facilities would handle No. 2 fuel oil; 1,229 facilities (32% × 3,842) would handle No. 6 fuel oil; and 499 facilities (13% × 3,842) would handle crude oil; this sums to 3,842 facilities. Therefore, the maximum number of facilities subject to TRI reporting for lead at a lower threshold would be 3,842 facilities.

To determine the number of facilities that may submit additional TRI reports for lead and lead compounds at the lower reporting thresholds, the model facilities, and their corresponding annual product throughput estimates listed in the *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313* were used (U.S. EPA, 1997a). Table A-29 reproduces Table H-2 of the industry expansion economic analysis which presents the annual throughputs and number of facilities represented by the model.

TABLE A-29
ANNUAL THROUGHPUT ESTIMATES AND TOTAL NUMBER OF FACILITIES BY SIC CODE 5171 MODEL FACILITIES

Product	Annual Throughput for Each Model Facility Size Category (1,000 gallons/year)					
	1	2	3	4	5	6
Gasoline	3,750	5,100	34,500	85,000	170,000	340,000
No. 6 Fuel Oil	45	61	4,809	12,022	24,045	48,090
Crude Oil	371	505	17,862	44,655	89,317	178,623
No. 2 Fuel Oil	1,665	2,264	11,166	27,916	55,832	111,665
Lubricating Oils	156	213	176	441	883	1,767
Aviation Gas	17	24	161	404	808	1,616
Jet Fuel	45	62	2,738	6,847	13,694	27,389
Total Number of Facilities	**1,906**	**558**	**551**	**317**	**372**	**138**

Source: U.S. EPA, 1997a
Notes: No throughput is estimated for additives. Annual throughput for each product was calculated by multiplying the daily throughput by 340 days for bulk terminals and 300 days for bulk plants. Model facility throughputs for each product type were calculated separately; this does not mean that each model facility handles all seven petroleum products. Estimates of the number of facilities and annual throughput for gasoline are based on "Model Plants" described in U.S. EPA, 1997a. Model Facility 1 and 2 are based on Model Plant Numbers 4 and 5, respectively, in the Background Information document. Model Facilities 3, 4, 5, and 6 are based on Model Terminal Numbers 1 through 4.

Using the annual model throughputs above for each fuel type known to contain lead and lead compounds, the amount of lead processed through each model facility was determined. The number of facilities represented by each model above that handle these fuels was determined using the appropriate percentages. Table A-30 presents the results for this analysis; a sample calculation is shown below.

Sample calculation for annual lead throughputs for Model Facility 6:

No. 2 fuel oil: (111,665,000 gal oil/yr) × (7.3 lb oil/ gal oil) × (0.5 lb lead/10^6 lb oil)
= 408 lbs lead/yr
No. 6 fuel oil: (48,090,000 gal oil/yr) × (8 lb oil/ gal oil) × (1 lb lead/10^6 lb oil)
= 385 lbs lead/yr
Crude oil: (178,623,000 gal oil/yr) × (8.345 lb oil/ gal oil) × (0.31 lb lead/10^6 lb oil)
= 462 lbs lead/yr

Gasoline: (340,000,000 gal oil/yr) × (8.345 lb gas/ gal oil) × (0.079 lb lead/10^6 lb gas)
= 224 lbs lead/yr
Av. Gas: (1,616,000 gal oil/yr) × (8.345 lb av. gas/ gal oil) × (1,750 lb lead/10^6 lb gas)
= 23,594 lbs lead/yr

Number of facilities represented by Model Facility 6 that handle each product:

Gasoline: 64% × 138 = 88
No. 2 fuel oil: 55% × 138 = 76
No. 6 fuel oil: 32% × 138 = 44
Crude oil: 13% × 138 = 18
Aviation gas: 4% × 138 = 6

For Model Facility 6, lead quantities in all five petroleum products exceed the 1-, 10-, and 100-pound thresholds. The minimum number of facilities expected to submit additional TRI reports equals the 88 facilities handling gasoline, assuming the same facilities also handle No. 6 fuel, No. 2 fuel oil, aviation gas, and crude oil. The maximum number of facilities expected to submit additional TRI reports equals the maximum number of facilities represented by model facility six, assuming some facilities handle multiple petroleum products while others handle a single petroleum product. The maximum number is then equal to 138 facilities.

At a reporting threshold of 1,000 pounds per year, only the processing of aviation gas at Model Facility 6 facilities is expected to exceed the threshold for lead. Therefore, the minimum and maximum number of facilities expected to submit additional TRI reports equals the six facilities handling aviation gas.

Although the first year of TRI reporting has not yet been received from this sector, based on available information it appears that no facilities will report on lead or lead compounds at current thresholds. For each of the lower reporting thresholds, the total range of facilities that may submit additional TRI reports for lead were determined by adding the results for each of the models (see Tables A-31a, A-31b, and A-32). An additional 2,459; 980; 621; and 55 facilities are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, 100-, and 1,000-pound thresholds, respectively.

TABLE A-30
ESTIMATED LEAD USAGE FOR SIC CODE 5171 MODEL FACILITIES

Model				Lead Analysis		
Model Facility Number	Number of Facilities	Fuel Type	Annual Throughput (10^3 gal/yr)	% of Facilities Handling Each Fuel Type	Facilities Handling Each Fuel	Estimated Lead Throughput Per Facility (lb/yr)
1	1,906	No. 2 Fuel Oil	1,665	55%	1,048	6
		No. 6 Fuel Oil	45	32%	610	0
		Crude Oil	371	13%	248	1
		Gasoline	3,750	64%	1,220	2
		Aviation Gas	17	4%	76	248
2	558	No. 2 Fuel Oil	2,264	55%	307	8
		No. 6 Fuel Oil	61	32%	179	0
		Crude Oil	505	13%	73	1
		Gasoline	5,100	64%	357	3
		Aviation Gas	62	4%	22	350
3	551	No. 2 Fuel Oil	11,166	55%	303	41
		No. 6 Fuel Oil	4,809	32%	176	38
		Crude Oil	17,862	13%	72	46
		Gasoline	34,500	64%	353	23
		Aviation Gas	2,738	4%	22	2,351
4	317	No. 2 Fuel Oil	27,916	55%	174	102
		No. 6 Fuel Oil	12,022	32%	101	96
		Crude Oil	44,655	13%	41	116
		Gasoline	85,000	64%	203	56
		Aviation Gas	6,847	4%	13	5,898
5	372	No. 2 Fuel Oil	55,832	55%	205	204
		No. 6 Fuel Oil	24,045	32%	119	192
		Crude Oil	89,317	13%	48	231
		Gasoline	170,000	64%	238	112
		Aviation Gas	13,694	4%	15	11,797
6	138	No. 2 Fuel Oil	111,665	55%	76	408
		No. 6 Fuel Oil	48,090	32%	44	385
		Crude Oil	178,623	13%	18	462
		Gasoline	340,000	64%	88	224
		Aviation Gas	27,389	4%	6	23,549

TABLE A-31a
SIC 5171: PETROLEUM BULK STATIONS AND TERMINALS

Lead threshold	Estimated reports due to gasoline [a]	Estimated reports due to residual oil [a]	Estimated reports due to distillate oil [a]	Estimated reports due to crude oil [a]	Estimated reports due to aviation gas [a]
1 lb	2,459	441	2,113	252	154
10 lbs	882	441	758	179	154
100 lbs	326	163	455	108	154
1,000 lbs	0	0	0	0	55

TABLE A-31b
SIC 5171: PETROLEUM BULK STATIONS AND TERMINALS

Lead threshold	Minimum estimated number of reports [b]	Maximum estimated number of reports [c]
1 lb	2,459	3,842
10 lbs	980	2,414
100 lbs	621	1,206
1,000 lbs	55	55

a. Lead concentrations for the different fuel types were applied to six different model facility size categories. See the attached table for a more detailed breakdown.
b. The minimum estimated number of reports assumes maximum overlap of facilities that process more than one fuel type.
c. The maximum estimated number of reports assumes minimum overlap of facilities that process more than one fuel type.

TABLE A-32
SIC 5171: PETROLEUM BULK STATIONS AND TERMINALS
ESTIMATES BASED ON MODEL FACILITY SIZE CATEGORIES

Type of fuel processed	Model facility size category 1	2	3	4	5	6	Subtotal	Total minimum number of facilities [a]	Total maximum number of facilities [a]
1 lb threshold								2,459	3,842
Gasoline	1,220	357	353	203	238	88	2,459		
No. 6 residual fuel oil	0	0	176	101	119	44	441		
No. 2 distillate fuel oil	1,048	307	303	174	205	76	2,113		
Crude oil	0	73	72	41	48	18	252		
Aviation gas	76	22	22	13	15	6	154		
Maximum number of facilities	1,220	357	353	203	238	88	2,459		
10 lb threshold								980	2,414
Gasoline	0	0	353	203	238	88	882		
No. 6 residual fuel oil	0	0	176	101	119	44	441		
No. 2 distillate fuel oil	0	0	303	174	205	76	758		
Crude oil	0	0	72	41	48	18	179		
Aviation gas	76	22	22	13	15	6	154		
Maximum number of facilities	76	22	353	203	238	88	980		
100 lb threshold								621	1,206
Gasoline	0	0	0	0	238	88	326		
No. 6 residual fuel oil	0	0	0	0	119	44	163		
No. 2 distillate fuel oil	0	0	0	174	205	76	455		
Crude oil	0	0	0	41	48	18	108		
Aviation gas	76	22	22	13	15	6	154		
Maximum number of facilities	76	22	22	174	238	88	621		
1,000 lb threshold								55	55
Gasoline	0	0	0	0	0	0	0		
No. 6 residual fuel oil	0	0	0	0	0	0	0		
No. 2 distillate fuel oil	0	0	0	0	0	0	0		
Crude oil	0	0	0	0	0	0	0		
Aviation gas	0	0	22	13	15	6	55		
Maximum number of facilities	0	0	22	13	15	6	55		

a. Range estimated based on the fact that not all establishments handle all products. For example, for Model Facility 3, 176 facilities may handle No. 6 fuel oil and crude oil) or 176 facilities handling No. 6 fuel oil plus 72 facilities handling crude oil equals 248 total facilities.

Solvent Recovery Services (SIC Code 7389)

To estimate the number of solvent recovery facilities that may report on lead and lead compounds at lower reporting thresholds, data on off-site transfers from TRI facilities in 1996 were used. The TRI data have certain limitations when used for this purpose. First, TRI data may underestimate the *number of reporting facilities* because TRI-subject solvent recovery facilities that receive wastes only from non-TRI facilities would not appear in TRI. Second, the TRI data may underestimate the *amount of the chemical* because it does not include transfers that the solvent recovery facility may receive from non-TRI facilities, or transfers from TRI facilities for chemicals that did not exceed current reporting thresholds.

Therefore, for this analysis, each facility was assumed to represent two facilities, and the amount transferred was doubled to account for additional quantities not captured under current TRI reporting. Although the first year of TRI reporting has not yet been received from this sector, based on available information it appears that 10 facilities will report on lead or lead compounds at current thresholds. An additional 26, 24, 22, and 14 facilities are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, 100-, and 1,000-pound thresholds, respectively (see Table A-33, and facility-specific information presented at the end of the Appendix in Table A-52).

TABLE A-33
SIC 7389: SOLVENT RECOVERY SERVICES

Threshold	Estimated number of lead reports		
	Total number of reports (current + additional)	Current number of reports	Additional number of reports
1 lb	36	10	26
10 lbs	34	10	24
100 lbs	32	10	22
1,000 lbs	24	10	14
10,000 lbs	10	10	0
25,000 lbs	4	4	0

Combustion in Manufacturing Facilities and Electric Utilities (SIC Codes 20–39, 4911, 4931, 4939)

The approach used to estimate the number of manufacturing facilities (SIC 20-39) and electric utilities (SIC 4911, 4931, and 4939) that are expected to exceed the lower TRI reporting thresholds for lead and lead compounds as a result of fuel usage is described below:

- Determine typical concentrations for lead in the various fuels;
- Calculate the minimum annual throughput of various fuels needed to exceed each of the lower thresholds;

- Estimate the percentage of facilities that burn enough fuel to exceed the threshold for lead; and
- Estimate the total number of facilities expected to submit reports at each of the lower reporting thresholds.

The number of manufacturing facilities estimated to report due to combustion may represent an overestimate, as facilities may already report for lead or lead compounds at current reporting thresholds as a result of other non-combustion activities. For example, using the methodology outlined above, a facility in SIC Code 32 (stone, clay, glass, and concrete) may be predicted to submit a report as a result of fuel combustion. However, this facility may be one of the 77 facilities that currently report to TRI as a result of other, non-combustion activities involving lead or lead compounds.

A description of the steps outlined above is provided in the following subsections.

Typical Lead Concentrations in Various Fuels

Table A-34 shows the various fuels used by facilities, the typical concentration of lead in each fuel type, and the fuel amounts needed to exceed the lower reporting thresholds. A range of chemical concentrations is possible depending on the source of the fuel. Typical concentrations provided in the literature were selected to obtain realistic estimates of additional reports (U.S. EPA, 1998a;1998e) .

TABLE A-34
ESTIMATED QUANTITY OF FUEL THROUGHPUT REQUIRED TO EXCEED LOWER REPORTING THRESHOLDS

Fuel Type	Concentration of Lead (a)	Fuel Amounts to Exceed Lower Reporting Thresholds (b)			
		1 lb	10 lbs	100 lbs	1,000 lbs
Coal (tons)	0.030 lb/ton	33	332	3,315	33,154
Residual Oil (bbl)	0.00033 lb/bbl	3,030	30,301	303,008	3,030,077
Distillate Oil (bbl)	0.000165 lb/bbl	6,060	60,602	606,015	6,060,153
Natural Gas (c)	0 lb/MMCF	--	--	--	--
Wood Waste (tons)	0.043 lb/ton	23	232	2,321	23,208

(a) Adjusted to account for formation of the metal oxide.
(b) Note: due to rounding, calculations may not yield exact numbers.
(c) Note: Available concentration data is based on limited sources and therefore considered unreliable. Available data estimates concentration of lead in natural gas as 0.1 ppmv or 0.05882 lbs/MMCF. Assuming data are accurate, the following throughputs would be required at each threshold: 17 MMCF at 1 lb; 170 MMCF at 10 lbs; 1,700 MMCF at 100 lbs; and 17,002 MMCF at 1,000 lbs.

Fuel Usage Required to Exceed Reporting Thresholds

Once the concentration of lead in a fuel is determined, estimating the amount of fuel required to exceed a reporting threshold is straightforward, requiring a simple set of calculations. Table A-35 provides a list of conversion factors used in the calculations throughout this appendix.

TABLE A-35
CONVERSION FACTORS USED TO CALCULATE
FUEL THROUGHPUTS

Parameter	Calculation Data
Density of Residual Oil:	7.3 lbs/gallon (0.876 kg/L)
Density of Distillate Oil :	7.3 lbs/gallon (0.876 kg/L)
Energy Content of Distillate Oil:	139,000 Btu/gallon
Ton:	2,000 lbs
Barrel:	42 gallons (petroleum, U.S.)
Kilogram:	2.2 pounds
Gallon:	3.785 liters
1 ppm (solid):	1 mg/kg
1 ppm (liquid):	1 mg/L
1 ppm (gas):	1 microgram/cubic meter
1 microgram/cubic meter:	62.43×10^{-9} lbs/1,000 cubic feet

As an example, the following calculation shows the procedure used to estimate the amount of coal needed to reach the lower reporting thresholds for lead, based on a lead concentration of 14 ppm in coal. For lead, combustion results in the manufacture of lead oxide (PbO). Since the metal oxide is heavier than the parent metal, the manufacturing threshold for metal compounds will be exceeded before the otherwise use threshold for the parent metal (i.e., less fuel is required to reach the threshold for the metal compound as compared to the parent metal). To estimate the amount of each fuel type required to reach the current thresholds, a factor was applied to the calculation to account for the manufacture of metal oxides. For lead, the factor is 0.928 based on the molecular weight ratio of Pb to PbO (207.2/223.2).

Sample calculation for coal:

1 lb threshold: (1,000,000 mg/kg) x (1/14 mg/kg) x (1 ton/2,000 lbs) / .928 = 33 tons coal
10 lb threshold: 33 tons coal x 10 = 332 tons coal
100 lb threshold: 33 tons coal x 100 = 3,315 tons coal
1,000 lb threshold: 33 tons coal x 1,000 = 33,154 tons coal

Estimation of Reporting from Manufacturing Facilities

To determine the percentage of manufacturing facilities burning sufficient fuel to exceed the 1-, 10-, 100-, 1,000-, and 10,000-lb/year reporting thresholds, this analysis used the Industrial Combustion Coordinated Rulemaking (ICCR) database created by EPA in 1998 (U.S. EPA, 1998f). The ICCR database is a combustion unit inventory database that contains information on industrial and commercial combustion sources. The ICCR database includes information from EPA and state electronic databases, most importantly the EPA Aerometric Information Retrieval System (AIRS) and the Ozone Transport Assessment Group (OTAG) databases. In addition, 17 state databases were merged into the ICCR database. In merging these various databases, care was given not to enter duplicate records for any facility or combustion unit.

The ICCR database does not include information to determine the actual amount of fuel throughput for every facility. While approximately 60 percent of the boiler-specific records contain a fuel flow rate or operating rate that can be used as a fuel throughput, the other 40 percent do not have this information. For records without flow rate or operating rate information, fuel throughput was estimated using the design capacity and operating hours. Since approximately 20 percent of boilers in the ICCR database burn multiple fuels, individual fuel throughput is overestimated for these records. The fuel throughputs for each boiler at a given facility burning a given fuel type were summed to determine the facility level fuel usage in a given fuel type. Table A-36 summarizes the ICCR information for manufacturing facilities, including maximum fuel throughput and the number of facilities by decile. Using the ICCR data and the fuel throughput information in Table A-34, the percentage of facilities using the minimum fuel throughput needed to exceed each reporting threshold was calculated. The percentage was calculated by counting the number of facilities with annual fuel throughputs greater than the minimum and dividing by the total number of facilities. Table A-37 summarizes the percentage of facilities exceeding each reporting threshold by fuel type and chemical.

TABLE A-36
FUEL THROUGHPUT OF MANUFACTURING FACILITIES

Decile	Coal		Distillate Oil		Residual Oil		Wood		Natural Gas	
	Maximum Throughput (tons)	Number of Facilities	Maximum Throughput (barrels)	Number of Facilities	Maximum Throughput (barrels)	Number of Facilities	Maximum Throughput (tons)	Number of Facilities	Maximum Throughput (MMCF) (a)	Number of Facilities
10	2,540,304	68	17,937,143	262	11,033,244	212	7,356,002	140	613,330	925
9	139,170	68	104,836	262	215,467	212	153,921	140	961	925
8	69,855	68	50,139	262	105,595	213	55,787	140	458	925
7	39,900	68	19,739	262	63,556	213	27,894	140	231	925
6	24,393	68	8,205	262	35,200	213	18,537	140	104	925
5	15,470	68	3,646	262	17,690	213	13,283	141	54	924
4	7,014	68	1,405	263	9,119	213	6,833	141	30	924
3	2,218	68	548	263	3,929	213	3,213	141	14	924
2	388	68	187	263	976	213	1,300	141	4	924
1	25	69	21	263	36	213	103	141	.017	924
TOTAL		**681**		**2,624**		**2,128**		**1,405**		**9,245**

(a) million cubic feet

TABLE A-37
PERCENTAGE OF MANUFACTURING FACILITIES WITH FUEL COMBUSTION ACTIVITIES EXCEEDING LOWER THRESHOLDS FOR LEAD BY FUEL TYPE

Fuel Type	Percentage of Facilities Exceeding Lower Reporting Thresholds			
	1 lb	10 lbs	100 lbs	1,000 lbs
Coal	88.5%	80.6%	67.0%	34.5%
Residual Oil	72.2%	42.1%	6.4%	0.2%
Distillate Oil	44.3%	17.0%	1.6%	0.1%
Wood Waste	92.1%	88.8%	74.4%	36.4%
Natural Gas (a)	0.0%	0.0%	0.0%	0.0%

(a) As concentration data for natural gas are considered unreliable, no facilities are predicted to report. If the available concentration data are accurate, the following percentages would apply: 67.7% at 1 lb, 33.8% at 10 lbs, 5.7% at 100 lbs, and 0.9% at 1,000 lbs.

To determine the number of facilities that burn sufficient fuel to reach each threshold, the percentage of facilities burning the minimum amount of fuel, determined from the ICCR database, was applied to the total number of facilities using each fuel obtained from the 1994 Manufacturing Energy Consumption Survey (MECS), which is conducted every four years by the Energy Information Administration of the Department of Energy. The MECS information was used rather than the ICCR information to account for the number of facilities with greater than 10 employees. Table A-38 shows the total number of manufacturing facilities using various fuel types. The first column on the table shows the total number of facilities reporting the use of the fuel. As some facilities use more than one fuel, summing the number of facilities across fuel types results in some overcounting of facilities. MECS does not contain information for wood waste combustion. The total number of facilities in the ICCR database reporting wood combustion was used instead.

The total number of facilities reporting any on-site energy generation is approximately 247,000 (U.S. DOE, 1997). The total number of facilities in SIC codes 20-39 with more than 10 employees is approximately 185,000 (Bureau of Census, 1995). This indicates that about 25 percent of the facilities reporting under MECS have fewer than 10 employees. Facilities with fewer than 10 employees are not be required to report under EPCRA Section 313. Therefore, the total number of facilities shown in the second column of Table A-38 have been reduced by 25 percent.

Since TRI reporting exempts fuel usage for employee personal use (heating, lighting, ventilation) and for motor vehicles from reporting threshold calculations, the number of facilities shown in Table A-12 have also been reduced by applying factors to account for non-process fuel usage. The percentage of process and non-process fuel use plus the total fuel use was obtained from MECS, as shown in Table A-39.

TABLE A-38
NUMBER OF MANUFACTURING FACILITIES USING VARIOUS FUEL TYPES

Fuel Type	Total Number of Facilities	Estimated Number of Facilities with 10 or More Employees (a)	Process Use/Exempt Use Adjustment Factor	Estimated Number of Facilities Subject to Reporting for Combustion (b)
Coal	1,144	858	99%	849
Residual Oil	2,992	2,244	97%	2,177
Distillate Oil	35,920	26,940	68%	18,319
Natural Gas	158,775	119,081	88%	104,791
Wood Waste	1,405	1,054	n/a	1,054

(a) Number of total facilities decreased by 25% to account for those with less than 10 employees.
(b) Due to rounding, calculations may not yield exact numbers.

TABLE A-39
MANUFACTURING FACILITY FUEL USE BY ACTIVITY

	Coal (1,000 tons)	Residual Oil (1,000 barrels)	Distillate Oil (1,000 barrels)	Natural Gas (billion cubic feet)
Total Fuel	54,143	70,111	26,107	5,962
Non-process Fuel	378	2,197	8,349	705
Percent Non-process	1%	3%	32%	12%

Using the adjusted total number of facilities shown in Table A-38, and applying the percentages shown in Table A-37, the total number of facilities meeting the various thresholds was determined. Table A-40 shows the number of facilities exceeding the lower reporting thresholds for lead by fuel type. The total number of TRI reports expected at each threshold for each chemical associated with fuel combustion is provided at the bottom of the table.

TABLE A-40
NUMBER OF MANUFACTURING FACILITIES EXCEEDING THE LOWER REPORTING THRESHOLDS FOR LEAD

Fuel Type	Number of Facilities Exceeding Lower Reporting Thresholds (a)			
	1 lb	10 lbs	100 lbs	1,000 lbs
Coal	752	684	568	293
Residual Oil	1,572	917	140	4
Distillate Oil	8,119	3,121	30	14
Wood Waste	971	936	785	384
Natural Gas (b)	--	--	--	--
TOTAL	**11,414**	**5,658**	**1,794**	**695**

(a) Due to rounding, calculations may not yield exact numbers.
(b) As concentration data for natural gas are considered unreliable, no facilities are expected to report. If the available concentration data are accurate, the following numbers would apply: 70,979 facilities at 1 lb; 35,376 at 10 lbs; 5,939 at 100 lbs; and 963 at 1,000 lbs.

Estimation of Reporting from Electric Utilities

Coal- and oil-burning establishments in the following sectors engage in the generation, transmission, and distribution of electricity, gas, or steam. These facilities are subject to TRI reporting:

- Electric Services (SIC 4911);Electric and Other Services Combined (SIC 4931); andCombination Utilities, Not Otherwise Classified (SIC 4939).

References to coal and oil facilities in this appendix refer specifically to facilities that burn coal or oil in the production of electricity for distribution in commerce.

For this analysis, electric utility facilities were grouped according to their primary fuel type. The analysis considered 390 coal, 124 oil, and 49 combined-cycle electric utility facilities in SIC 4911 (U.S. EPA, 1997a). The analysis also considered 197 coal-fired and 98 oil-fired facilities in SIC 4931, and 19 coal-fired and 14 oil-fired facilities in SIC 4939.

The estimated number of facilities in SIC 4911 exceeding the proposed thresholds for lead was determined by calculating the total pounds of lead manufactured at each facility using throughput information for all fuels combusted at each facility and the lead concentration data presented in Table A-34. Although facilities were grouped by primary fuel type, most facilities utilize more than one fuel type. This approach accounts for lead manufactured due to the combustion of all fuel types at each facility.

To estimate the number of facilities in SIC 4931 and 4939, the percentage of facilities in SIC 4911 exceeding each threshold was applied to the number of facilities in SIC 4931 and 4939 by fuel type. The total number and percentage of facilities in SIC 4911 exceeding each threshold for lead is presented by fuel type in Table A-41. The number of oil and coal burning facilities by SIC code and the total number of facilities predicted to report at each threshold for lead are provided in Table A-42. Although the first year of TRI reporting by Electric Utilities has not been received, based on the concentrations of lead in fuel the following numbers of TRI reports were predicted for current thresholds: 235 reports for SIC 4911, 119 reports for SIC 4931, and 11 reports for SIC 4939. This current reporting is reflected in Table A-44.

TABLE A-41
PERCENTAGE OF FACILITIES IN SIC 4911
EXCEEDING LOWER THRESHOLDS

	Lead Reporting at the Lower Reporting Thresholds (a)			
	1 lb	**10 lbs**	**100 lbs**	**1,000 lbs**
Coal Combustion				
Number of Facilities	390	390	390	390
Number of Facilities Exceeding Current Threshold	235	235	235	235
Number of Facilities Exceeding Proposed Threshold	155	155	153	146
Percentage of Facilities Exceeding Proposed Threshold	40%	40%	39%	37%
Oil Combustion				
Number of Facilities	124	124	124	124
Number of Facilities Exceeding Current Threshold	0	0	0	0
Number of Facilities Exceeding Proposed Threshold	91	72	43	11
Percentage of Facilities Exceeding Proposed Threshold	73%	58%	35%	9%

(a) Due to rounding, calculations may not yield exact numbers.
(b) The percent of facilities exceeding the proposed threshold for each fuel type is applied to the number of facilities burning that fuel in SIC codes 4931 and 4939 to estimate the number of facilities expected to report. Estimated numbers of facilities expected to exceed the proposed reporting threshold for SIC codes 4931 and 4939 are presented in Table A-42.

TABLE A-42
TOTAL NUMBER OF FACILITIES IN SIC 4911, 4931, AND 4939 EXCEEDING LOWER THRESHOLDS

Fuel Type	SIC Code	Number of Facilities Exceeding Lower Reporting Thresholds (a)			
		1 lb	10 lbs	100 lbs	1,000 lbs
Coal Combustion	4911	155	155	153	146
Oil Combustion	4911	91	72	43	11
Coal Combustion	4931	78	78	77	74
Oil Combustion	4931	72	57	34	9
Coal Combustion	4939	8	8	7	7
Oil Combustion	4939	10	8	5	1
TOTAL		**414**	**378**	**288**	**248**

(a) Due to rounding, calculations may not yield exact numbers.
(b) No facilities are expected to report due to lead manufactured through the combustion of natural gas as available concentration data for lead in natural gas is derived from limited sources. Fifty additional facilities from SIC 4911, 39 additional facilities from SIC 4931,and 5 additional facilities from SIC 4939 would be expected to report under the proposed option assuming available concentration data for lead in natural gas are accurate.

Summary of Estimated Reporting in Manufacturing Facilities and Electric Utilities Due to Combustion

Table A-43 summarizes the number of facilities expected to report at various thresholds for lead and lead compounds due to combustion. As shown, the expected number of reports decreases as the reporting threshold increases.

TABLE A-43
SUMMARY OF COMBUSTION-RELATED LEAD REPORTS AT LOWER THRESHOLDS FOR SIC 20-39, 4911, 4931, AND 4939

Number of Facilities in SIC 20-39, 4911, 4931, and 4939 Expected to Report for Lead at Each Threshold			
1 lb	10 lbs	100 lbs	1,000 lbs
11,828	6,036	2,082	943

A.3.3 SUMMARY OF ADDITIONAL REPORTS

Industries manufacturing, processing, or otherwise using lead and lead compounds that may submit TRI reports at the lower reporting thresholds are presented in Table A-44, along with the results of the analysis. The number of facilities reporting lead and lead compounds to TRI at current thresholds is also provided; these facilities have exceeded the current TRI reporting threshold criteria of 10,000 pounds per year for otherwise use, or the 25,000 pounds per year for either manufacture or process.

Lead and lead compounds were considered together since facilities can file a combined report if thresholds are exceeded for both the parent metals and compounds of that same metal. This analysis assumes that facilities exceeding lower thresholds for both lead and lead compounds will file a single report.

It is possible that some manufacturing facilities would be expected to submit a lead report as a result of both combustion and non-combustion activities. Therefore, it is necessary to adjust the total number of reports to avoid double-counting. As it is not possible to determine the extent of overlap between reporting due to combustion and non-combustion activities for each 4-digit SIC code, this adjustment is made by subtracting the number of reports resulting from combustion from the number of non-combustion related reports (i.e., this analysis is assuming that every facility reporting lead due to combustion activities is also reporting lead due to non-combustion activities). If the number of reports resulting from combustion exceeds the number of non-combustion related reports for a given two-digit SIC code, it is assumed that all facilities submitting a report for non-combustion activities would also be expected to submit a report as a result of combustion. In such cases, the number of reports resulting from non-combustion activities is subtracted. Table A-45 presents the expected number of lead reports due to combustion and non-combustion activities; the table also presents an adjustment number to account for the overlap of reports due to both activities. This adjustment number is applied to the total number of reports in Table A-44.

After adjusting the total number of reports to avoid double-counting, an additional 22,623; 15,043; 8,762; and 2,905 facilities are estimated to submit TRI reports for lead and lead compounds at the 1-, 10-, 100-, and 1,000-pound thresholds, respectively.

TABLE A-44
ESTIMATED NUMBER OF ADDITIONAL REPORTS FOR LEAD AND LEAD COMPOUNDS

SIC Code	Industry Sector	Total number of facilities with 10 employees	Number of facilities reporting at current thresholds	Number of additional facilities submitting reports			
				Greater than 1 lb	Greater than 10 lbs	Greater than 100 lbs	Greater than 1,000 lbs
1021	Copper ores	34	34	0	0	0	0
1031	Lead and zinc ores	23	23	0	0	0	0
12	Coal mining	321	0	321	321	321	321
2611	Pulp mills	48	0	48	48	29	0
2816	Inorganic pigments	25	17	8	8	8	8
2911	Petroleum refining	127	36	91	91	91	90
2951	Asphalt paving mixtures	942	0	942	26	0	0
3241	Cement, hydraulic	136	13	123	123	123	123
3312	Blast furnaces and steel mills	271	86	185	185	185	185
3313	Electrometallurgical products (ferroalloys)	29	5	24	24	15	0
3321	Gray/ductile iron foundries	492	20	472	472	472	472
3322	Malleable iron foundries	15	2	13	13	13	13
3324	Steel investment foundries	124	1	123	123	111	19
3325	Steel foundries, not elsewhere classified	225	8	217	217	217	68
3331	Primary copper smelting	6	6	0	0	0	0
3339	Primary smelting of nonferrous metals, except copper and aluminum	4	10	0	0	0	0
3341	Secondary smelting of nonferrous metals	75	64	11	11	11	0
3351	Copper rolling and drawing (brass and bronze)	100	15	85	85	85	85

TABLE A-44
ESTIMATED NUMBER OF ADDITIONAL REPORTS FOR LEAD AND LEAD COMPOUNDS

SIC Code	Industry Sector	Total number of facilities with 10 employees	Number of facilities reporting at current thresholds	Number of additional facilities submitting reports			
				Greater than 1 lb	Greater than 10 lbs	Greater than 100 lbs	Greater than 1,000 lbs
3482	Small arms ammunition	32	14	18	18	18	18
367	Electronic components and accessories	4,104	71	4,033	4,033	3,109	405
3691	Storage battery manufacturing	98	75	23	23	23	23
371	Motor vehicles and motor vehicle equipment	2,959	97	2,862	2,862	1,485	201
4911	Electric services	514	235	246	227	196	157
4931	Electric and other services combined	295	119	150	135	111	83
4939	Combination utilities, not elsewhere	33	11	18	16	12	8
4953	Refuse systems	162	60	80	74	64	36
5171	Petroleum bulk stations and terminals	3,842	0	2,459	980	621	55
7389	Solvent recovery services	40	10	26	24	22	14
20-39	Coal-fired industrial sources	849	unknown	752	684	568	293
20-39	Oil-fired industrial sources	20,496	unknown	9,691	4,038	440	18
20-39	Wood-fired industrial sources	1,054	unknown	971	936	785	384
Subtotal		37,475	1,032	23,992	15,797	9,135	3,079
Adjustment for double-counting (see Table A-45)		1,369	0	1,369	754	373	174
TOTAL		**36,106**	**1,032**	**22,623**	**15,043**	**8,762**	**2,905**

TABLE A-45
COMBUSTION FACILITIES AND ADJUSTED FACILITY ESTIMATES BY SIC CODE

SIC Code	Total Number of Facilities Reporting due to Combustion (a)				Total Number of Facilities Otherwise Reporting (b)				Combustion Facility Adjustment (c)			
	>1 lb	>10 lbs	>100 lbs	>1,000 lbs	>1 lb	>10 lbs	>100 lbs	>1,000 lbs	>1 lb	>10 lbs	>100 lbs	>1,000 lbs
20	1,337	742	291	120	0	0	0	0	0	0	0	0
21	66	48	29	13	0	0	0	0	0	0	0	0
22	582	382	184	79	0	0	0	0	0	0	0	0
23	218	91	16	4	0	0	0	0	0	0	0	0
24	2,167	860	107	16	0	0	0	0	0	0	0	0
25	221	127	60	28	0	0	0	0	0	0	0	0
26	637	416	211	94	48	48	29	0	48	48	29	0
27	489	212	41	11	0	0	0	0	0	0	0	0
28	945	506	188	77	8	8	8	8	8	8	8	8
29	286	149	50	19	1,033	117	91	90	286	117	50	19
30	426	233	84	33	0	0	0	0	0	0	0	0
31	70	43	18	7	0	0	0	0	0	0	0	0
32	1,083	519	171	71	123	123	123	123	123	123	123	71
33	417	213	77	32	1,130	1,130	1,109	842	417	213	77	32
34	764	337	79	27	18	18	18	18	18	18	18	18
35	709	301	53	14	0	0	0	0	0	0	0	0
36	226	110	32	12	4,056	4,056	3,132	428	226	110	32	12
37	243	117	36	14	2,862	2,862	1,485	201	243	117	36	14
38	196	75	7	0	0	0	0	0	0	0	0	0
39	332	176	58	22	0	0	0	0	0	0	0	0
Total (d)	**11,414**	**5,658**	**1,793**	**695**					**1,369**	**754**	**373**	**174**

(a) Zero facilities are predicted to report for lead due to natural gas combustion given the uncertainty regarding concentration data for lead in natural gas. Assuming available concentration data are accurate, an estimated 35,376 additional facilities would report at the proposed threshold. This estimate is based on a concentration of 0.1 ppm (by volume) for lead in natural gas, or 0.0546 pounds of lead per million cubic feet (U.S. EPA, 1998e).

(b) Number of facilities expected to report for an activity other than combustion.

(c) Number of facilities to be backed out of total at the two-digit SIC code level to avoid double-counting of facilities expected to report due to combustion and another activity.

(d) Totals may not exactly match the sum of each SIC code level due to rounding.

A.3.4 OTHER INDUSTRIES THAT MAY BE AFFECTED BY THE PROPOSED LEAD RULE

Due to a lack of data on lead consumption or emissions at the facility and sector level, this analysis did not estimate the number of additional lead reports to TRI at the lower thresholds for every industry group that may be affected by the proposed rule. In 1996, 40 four-digit SIC codes (excluding those listed in Table A-44) each had more than five facilities reporting lead or lead compounds to TRI at the current thresholds. This may indicate that additional facilities in these SIC codes use lead or lead compounds at levels below current thresholds but above the proposed thresholds, resulting in additional reporting at the lower thresholds. The SIC codes listed in Table A-46 may also be affected by the proposed lead rule. In addition, SIC 3443 (fabricated plate work) was added to Table A-46 based on lead consumption data from the U.S. Geological Survey, and SIC 5169 (wholesale distribution of chemicals), a TRI expansion industry, was added to the table because of the sector's potential for processing chemical products that contain lead as a trace constituent.

TABLE A-46
OTHER INDUSTRIES THAT MAY BE AFFECTED BY THE PROPOSED LEAD RULE

SIC Code	Industry Sector	Number of TRI Facilities (1996)	1996 TRI Total Air Emissions (pounds)	1996 TRI Total Section 8 Releases (pounds)	Potential Sources and Miscellaneous Comments
2819	Industrial inorganic chemicals, not elsewhere classified	28	3,247	473,320	Lead oxide and lead salt manufacturing; lead analytical reagents
2821	Plastics materials, synthetic resins, and nonvulcanizable elastomers	11	3,359	638,128	Lead-based heat stabilizers for PVC and other plastics
2851	Paints, varnishes, lacquers, enamels, and allied products	57	5,362	90,015	Lead drying agents and other additives. An order-of-magnitude estimate of 100 facilities would report at the 1-pound threshold (NPCA, 1999; U.S. EPA, 1998d; Bureau of the Census, 1996b).
2869	Industrial organic chemicals, not elsewhere classified	14	4,162	88,202	Lead catalysts and analytical reagents
2899	Chemicals and chemical preparations, not elsewhere classified	9	815	35,470	Lead oxides in frit manufacturing
3052	Rubber and plastics hose and belting	6	173	2,669	Lead pigments, fillers, activators, vulcanizers, curing additives, and plasticizers
3069	Fabricated rubber products, not elsewhere classified	10	45	16,928	Lead pigments, fillers, activators, vulcanizers, curing additives, and plasticizers
3081	Unsupported plastics film and sheet	13	1,624	14,428	Lead-based heat stabilizers for PVC and other plastics
3087	Custom compounding of purchased plastics resins	49	12,460	93,503	Lead-based heat stabilizers for PVC and other plastics
3089	Plastics products, not elsewhere classified	20	2,711	7,124	Lead-based heat stabilizers for PVC and other plastics
3229	Pressed and blown glass and glassware, not elsewhere classified	22	59,173	2,933,690	Lead components, including lead hydroxide, lead silicates, and litharge
3231	Glass products, made of purchased glass	13	3,749	104,682	Lead components, including lead hydroxide, lead silicates, and litharge
3269	Pottery products, not elsewhere classified	6	1,578	13,896	Lead oxides in frit manufacturing, lead components in glazes
3315	Steel wiredrawing and steel nails and spikes	37	14,601	681,868	
3316	Cold-rolled steel sheet, strip, and bars	9	55	15,055	
3317	Steel pipe and tubes	8	2,411	193,313	
3356	Rolling, drawing, and extruding of nonferrous metals, except copper and aluminum	14	2,867	5,665	Lead and lead alloy products, lead alloyed with other metal products
3357	Drawing and insulating of nonferrous wire	96	5,314	315,595	Lead in cable coverings
3363	Aluminum die-castings	7	119	370	
3365	Aluminum foundries	8	1,016	6,008	
3366	Copper foundries	38	20,785	69,658	Lead incorporated into brass and bronze products

TABLE A-46
OTHER INDUSTRIES THAT MAY BE AFFECTED BY THE PROPOSED LEAD RULE

SIC Code	Industry Sector	Number of TRI Facilities (1996)	1996 TRI Total Air Emissions (pounds)	1996 TRI Total Section 8 Releases (pounds)	Potential Sources and Miscellaneous Comments
3369	Nonferrous foundries, except copper and aluminum	30	10,386	162,859	
3399	Primary metal products, not elsewhere classified	18	5,150	144,734	
3429	Hardware, not elsewhere classified	13	787	1,571	
3432	Plumbing fixture fittings and trim	22	4,353	23,007	Lead incorporated into plumbing products, lead in solder
3441	Fabricated structural metal	13	0	9,543	Lead in solder
3443	Fabricated plate work (boiler shops)	1	5	111	Sheet lead, lead pipes and other extruded products, nuclear radiation shielding using lead. An order-of-magnitude estimate of 1,000 facilities would report (USGS, 1998a; Bureau of the Census, 1996b; 1992).
3451	Screw machine products	19	5	1,168	
3469	Metal stampings, not elsewhere classified	8	833	6,736	
3471	Electroplating, plating, polishing, anodizing, and coloring	17	757	12,197	Lead in solder
3479	Coating, engraving, and allied services, not elsewhere classified	32	565	20,389	
3494	Valves and pipe fittings, not elsewhere classified	25	6,104	17,975	Lead in solder
3496	Miscellaneous fabricated wire products	10	15,095	82,274	Lead in cable coverings
3499	Fabricated metal products, not elsewhere classified	29	13,495	50,621	Lead in solder
3559	Special industry machinery, not elsewhere classified	6	1,010	1,014	Lead in solder
3585	Air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment	8	2,406	12,766	
3641	Electric lamp bulbs and tubes	18	3,234	521,091	Lead in fluorescent lamps
3643	Current-carrying wiring devices	13	1,033	9,698	
3661	Telephone and telegraph apparatus	7	265	4,034	
3663	Radio and television broadcasting and communications equipment	8	29	1,207	
3694	Electrical equipment for internal combustion engines	7	1,110	736	Lead in cable coverings
5169	Chemical and allied products – wholesale trade	(a)	(a)	(a)	Lead as a trace constituent in chemical products

(a) SIC 5169 is a TRI expansion industry; reporting data will not be available until 2000.

TABLE A-47
SIC 2851: PAINTS, VARNISHES, LACQUERS, ENAMELS, AND ALLIED PRODUCTS

Scenario 1: Estimate using probable number of facilities affected

Number of facilities [a]	Amount of lead [b] (lbs)	Average amount of lead per facility (lbs)
56	32,090	573.00

Scenario 2: Estimate using upper limit of number of facilities affected

Number of facilities [a]	Amount of lead [b] (lbs)	Average amount of lead per facility (lbs)
336	32,090	96.00

a. Personal communication with National Paint and Coatings Association, 1999. There are approx. 1,200 coating manufacturing facilities. About 50% make architectural (lead-free) paint; the remaining 50% make industrial paint, of which 100 facilities are estimated to be using lead. An estimate on the upper limit of facilities potentially affected by the proposal was 500 to 600. Both estimates were multiplied by the percent of establishments in SIC 2851 that had 10 or more employees (56.1%) (Bureau of the Census, 1996b).

b. U.S. EPA, 1998d. This amount was multiplied by the percent of cost of materials for facilities in SIC 2851 with 10 or more employees (96.9%) (Bureau of the Census, 1992). Because total lead use is greater than lead emitted to air, this method underestimates the amount of total lead.

TABLE A-48
SIC 3443: FABRICATED PLATE WORK (BOILER SHOPS)

Facility size by number of employees [a]	Number of facilities [b]	Cost of materials [c] (million $)	Percent of total (lbs)	Amount of lead [d] (lbs)	Average amount of lead per facility [e]
1 to 9	638	143.9	3.4%	267,583	419
10 to 19	347	207.6	4.9%	386,033	1,112
20 to 49	512	686.6	16.1%	1,276,736	2,494
50 to 99	234	755.5	17.7%	1,404,855	6,004
100 to 249	176	1,332.8	31.3%	2,478,347	14,082
250 to 499	24	634.1	14.9%	1,179,112	49,130
500 to 2,499	10	498.7	11.7%	927,335	92,733
Total	1941	4,259.2	100.0%	7,920,000	

a. Some employee categories were combined because of combined facility data.

b. Bureau of the Census, 1996b. It was assumed that all facilities consume lead in the production of sheet lead, pipes, traps, other extruded products, and nuclear radiation shielding.

c. Bureau of the Census, 1992.

d. USGS, 1998a. It was assumed that production was proportional to the cost of materials for each facility size class. The combined amount of lead use for SIC 15 and 3443 was multiplied by the ratio of cost of materials for SIC 3443 to the combined cost of materials for SIC 15 and 3443.

e. For each facility size class, the average amount of lead was estimated by dividing the amount of lead corresponding with that size class by the number of facilities in that class.

LITERATURE CITED

American Society for Testing and Materials (ASTM) (1997). Annual Book of ASTM Standards. "Standard Specification for Aviation Gasoline."

Bureau of the Census (1996a). Current Industrial Reports, United States.

Bureau of the Census (1996b). County Business Patterns, United States. CBP/96-1.

Bureau of the Census (1992). Census of Manufactures: Final Reports, Industry Series.

Hawley's Condensed Chemical Dictionary, 13th edition (1997). Revised by Richard J. Lewis, Sr. New York: Van Nostrand Reinhold.

Kirk-Othmer Encyclopedia of Chemical Technology, 4th edition (1998). New York: John Wiley & Sons.

Society of Glass and Ceramic Decorators (SGCD) (1999). SGCD Guide to Heavy Metal Limits. Washington, DC.

Stone, Andrea (1999). "'Green' Army bullets to get the lead out," *USA Today*. February 23,1999.

Ullman's Encyclopedia of Industrial Chemistry, 5th edition (1990). Barbara Elvers, ed. New York: VCH Publishers.

U.S. Department of Energy (U.S. DOE) (1997). Manufacturing Consumption of Energy 1994; Energy Information Administration. DOE/EIA-0512.

U.S. Environmental Protection Agency (U.S. EPA) (1999a). Sector Facility Indexing Project web site (www.epa.gov/oeca/sfi). Office of Enforcement and Compliance Assurance.

U.S. Environmental Protection Agency (U.S. EPA) (1999b). Toxic Chemical Release Inventory Reporting Forms and Instructions. Office of Pollution Prevention and Toxics. EPA-745-K-99-001.

U.S. Environmental Protection Agency (U.S. EPA) (1998a). Locating and Estimating Air Emissions from Sources of Lead and Lead Compounds. Office of Air Quality Planning and Standards. EPA-454/R-98-006. May 1998.

U.S. Environmental Protection Agency (U.S. EPA) (1998b). National Air Pollutant Emission Trends Update: 1900-1997. Office of Air Quality Planning and Standards. EPA-454/E-98-007.

U.S. Environmental Protection Agency (U.S. EPA) (1998c). 1996 Toxic Release Inventory Database. Section 8: Source Reduction and Regulatory Activities. Frozen data as of February 17, 1998.

U.S. Environmental Protection Agency (U.S. EPA) (1998d). National Toxics Inventory, CD-ROM Version 9801. Emission Factor and Inventory Group.

U.S. Environmental Protection Agency (U.S. EPA) (1998e). Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report. Office of Air Quality Planning and Standards. EPA-453/R-98-004b. February 1998.

U.S. Environmental Protection Agency (U.S. EPA) (1998f). Industrial Combustion Coordinated Rulemaking (ICCR) Database, Version 3. Office of Pollution Prevention and Toxics.

U.S. EPA (1998g). The Inventory of Sources of Dioxin in the United States. Review Draft. Office of Research and Development. EPA 600/P-98-002Aa.

U.S. Environmental Protection Agency (U.S. EPA) (1997a). Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313. Office of Pollution Prevention and Toxics.

U.S. Environmental Protection Agency (U.S. EPA) (1997b). Locating and Estimating Air Emissions from Sources of Dioxins and Furans. Office of Air Quality Planning and Standards, Office of Air and Radiation. EPA 454-R-97-003, 1997.

U.S. Environmental Protection Agency (U.S. EPA) (1991). Characterization of Products Containing Lead and Lead Compounds for the Purpose of Developing a Significant New Use Rule for Lead, Final Draft. Office of Toxic Substances. March 29, 1991.

U.S. Geological Survey (USGS) (1999a). Mineral Commodity Summaries – Lead, January 1999.

U.S. Geological Survey (USGS) (1999b). Mineral Commodity Summaries – Iron and Steel, January.

U.S. Geological Survey (USGS) (1999c). Mineral Commodity Summaries – Aluminum, January.

U.S. Geological Survey (USGS) (1999d). Minerals Commodity Summaries – Copper, January.

U.S. Geological Survey (USGS) (1999e). Minerals Commodity Summaries – Zinc, January.

U.S. Geological Survey (USGS) (1998a). Minerals Yearbook 1997 – Lead.

U.S. Geological Survey (USGS) (1998b). Minerals Yearbook 1997 – Zinc.

Valkovic, Vlado (1978). *Trace Elements in Petroleum*. Tulsa, Oklahoma: The Petroleum Publishing Company.

PERSONAL COMMUNICATIONS

Alliance of Automobile Manufacturers (1999). Julie Becker. Telephone communication with Dennis Chang, Abt Associates Inc., April 14, 1999.

American Ceramic Society (1999). Greg Geiger, Technical Information Manager. Telephone communication with Trey Kellett, Abt Associates Inc., February 11, 1999.

Battery Council International (BCI) (1999). George Kershner, Legal Representative. Telephone communication with Dennis Chang, Abt Associates Inc., February 16, 1999.

Electronic Industries Alliance (1999). Bernard Aronson, Director of Technical Programs. Telephone communication with Trey Kellett, Abt Associates, Inc., April 5, 1999.

Lead Industries Association, Inc. (1999). Jeffrey Miller, Executive Director. Telephone communication with Trey Kellett, Abt Associates Inc., February 16, 1999.

National Asphalt Pavement Association (NAPA) (1999). Gary Fore, VP, Environmental Safety. Telephone communication with Dennis Chang, Abt Associates Inc., March 15, 1999.

National Paint and Coatings Association (NPCA) (1999). Stephen Sides, Director of Environmental, Health, and Safety. Telephone communication with Trey Kellett, Abt Associates Inc., March 10, 1999.

U.S. Geological Survey (USGS) (1999). Gerald Smith, Lead Specialist. Telephone communication with Dennis Chang, Abt Associates Inc., February 19, 1999.

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.VI0166	495,000	60,722	18,824
PET.TX0155	433,000	53,117	16,466
PET.LA0062	424,000	52,013	16,124
PET.IN0055	410,000	50,295	15,592
PET.TX0130	396,000	48,578	15,059
PET.PA0122	315,000	38,642	11,979
PET.TX0131	315,000	38,642	11,979
PET.LA0072	305,000	37,415	11,599
PET.TX0154	301,000	36,924	11,446
PET.MS0087	295,000	36,188	11,218
PET.IL0052	268,000	32,876	10,192
PET.TX0143	265,000	32,508	10,077
PET.LA0068	255,000	31,281	9,697
PET.TX0137	255,000	31,281	9,697
PET.CA0024	237,000	29,073	9,013
PET.TX0150	235,000	28,828	8,937
PET.LA0063	231,500	28,398	8,804
PET.CA0021	230,000	28,214	8,746
PET.CA0030	230,000	28,214	8,746
PET.MN0084	230,000	28,214	8,746
PET.LA0066	225,000	27,601	8,556
PET.TX0141	215,900	26,485	8,210
PET.LA0076	215,000	26,374	8,176
PET.NJ0096	215,000	26,374	8,176
PET.TX0133	215,000	26,374	8,176
PET.KY0060	213,400	26,178	8,115
PET.WA0169	202,000	24,780	7,682
PET.LA0081	191,000	23,430	7,263
PET.IL0048	188,000	23,062	7,149
PET.TX0148	185,000	22,694	7,035
PET.IL0051	175,000	21,468	6,655
PET.PA0121	175,000	21,468	6,655
PET.TX0149	175,000	21,468	6,655
PET.PA0120	172,000	21,099	6,541

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.LA0064	170,000	20,854	6,465
PET.OH0107	161,000	19,750	6,123
PET.CA0026	160,000	19,627	6,085
PET.CA0025	148,900	18,266	5,662
PET.IL0050	147,000	18,033	5,590
PET.DE0041	140,000	17,174	5,324
PET.OK0112	140,000	17,174	5,324
PET.OH0108	136,000	16,683	5,172
PET.WA0168	136,000	16,683	5,172
PET.TX0153	132,000	16,193	5,020
PET.CA0034	130,000	15,947	4,944
PET.TX0135	130,000	15,947	4,944
PET.AK0003	128,200	15,726	4,875
PET.CA0019	128,000	15,702	4,868
PET.CA0038	127,500	15,641	4,849
PET.NJ0098	126,000	15,457	4,792
PET.NJ0101	125,000	15,334	4,754
PET.OH0109	125,000	15,334	4,754
PET.TX0157	123,500	15,150	4,696
PET.WA0167	108,200	13,273	4,115
PET.TX0140	106,745	13,095	4,059
PET.TX0139	104,000	12,758	3,955
PET.KS0057	100,000	12,267	3,803
PET.LA0075	100,000	12,267	3,803
PET.TX0147	100,000	12,267	3,803
PET.TX0136	95,000	11,654	3,613
PET.WA0170	95,000	11,654	3,613
PET.KS0058	94,600	11,605	3,597
PET.HI0044	93,500	11,470	3,556
PET.TN0128	89,000	10,918	3,385
PET.TX0142	87,000	10,672	3,308
PET.OK0115	85,000	10,427	3,232
PET.PR0127	85,000	10,427	3,232
PET.IL0049	80,750	9,906	3,071

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.IL0046	80,515	9,877	3,062
PET.NJ0099	80,000	9,814	3,042
PET.CA0031	77,000	9,446	2,928
PET.KS0059	75,600	9,274	2,875
PET.TX0158	75,000	9,200	2,852
PET.AK0001	72,000	8,832	2,738
PET.AL0008	71,000	8,710	2,700
PET.TX0144	71,000	8,710	2,700
PET.MI0083	70,000	8,587	2,662
PET.TX0156	70,000	8,587	2,662
PET.CA0037	68,000	8,342	2,586
PET.OK0110	68,000	8,342	2,586
PET.MN0085	67,100	8,231	2,552
PET.OH0106	66,000	8,096	2,510
PET.CA0036	64,000	7,851	2,434
PET.IL0047	62,500	7,667	2,377
PET.CA0018	60,800	7,458	2,312
PET.LA0070	60,000	7,360	2,282
PET.PA0124	60,000	7,360	2,282
PET.ND0095	58,000	7,115	2,206
PET.NJ0100	58,000	7,115	2,206
PET.CO0040	57,500	7,054	2,187
PET.NM0102	57,000	6,992	2,168
PET.KS0056	56,000	6,870	2,130
PET.TX0132	55,000	6,747	2,092
PET.TX0159	55,000	6,747	2,092
PET.HI0045	54,000	6,624	2,054
PET.OK0114	54,000	6,624	2,054
PET.WY0179	54,000	6,624	2,054
PET.VA0165	53,000	6,502	2,015
PET.OK0116	52,000	6,379	1,977
PET.AR0010	51,000	6,256	1,939
PET.CA0022	50,000	6,134	1,901
PET.MT0091	49,500	6,072	1,882

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.LA0077	48,500	5,950	1,844
PET.CA0029	46,500	5,704	1,768
PET.CA0032	46,500	5,704	1,768
PET.LA0079	46,200	5,667	1,757
PET.MI0082	45,600	5,594	1,734
PET.PR0126	45,000	5,520	1,711
PET.UT0162	45,000	5,520	1,711
PET.MT0092	44,000	5,398	1,673
PET.UT0161	44,000	5,398	1,673
PET.TX0129	42,750	5,244	1,626
PET.CA0014	42,000	5,152	1,597
PET.MT0094	41,450	5,085	1,576
PET.LA0080	40,000	4,907	1,521
PET.NJ0097	40,000	4,907	1,521
PET.WY0176	38,670	4,744	1,471
PET.AL0009	33,500	4,109	1,274
PET.WI0174	33,200	4,073	1,263
PET.WA0173	32,400	3,975	1,232
PET.TX0146	28,600	3,508	1,088
PET.CO0039	28,000	3,435	1,065
PET.GA0043	28,000	3,435	1,065
PET.LA0073	27,600	3,386	1,050
PET.TX0138	27,000	3,312	1,027
PET.AK0006	26,300	3,226	1,000
PET.PA0123	25,000	3,067	951
PET.UT0164	25,000	3,067	951
PET.WY0177	24,500	3,005	932
PET.CA0016	24,300	2,981	924
PET.UT0160	24,000	2,944	913
PET.MS0090	23,000	2,821	875
PET.IN0054	22,000	2,699	837
PET.CA0015	21,400	2,625	814
PET.NM0104	20,800	2,552	791
PET.OR0117	18,000	2,208	685

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.NM0103	16,800	2,061	639
PET.AL0007	16,500	2,024	627
PET.AK0005	15,000	1,840	570
PET.WY0178	12,555	1,540	477
PET.LA0071	12,500	1,533	475
PET.UT0163	12,500	1,533	475
PET.AK0002	12,000	1,472	456
PET.CA0017	12,000	1,472	456
PET.WA0172	11,900	1,460	453
PET.WV0175	11,500	1,411	437
PET.IN0053	11,100	1,362	422
PET.MS0088	11,000	1,349	418
PET.CA0023	10,800	1,325	411
PET.OK0113	10,500	1,288	399
PET.AK0004	10,000	1,227	380
PET.PA0118	10,000	1,227	380
PET.LA0065	9,500	1,165	361
PET.CA0020	9,000	1,104	342
PET.LA0078	8,200	1,006	312
PET.CA0033	8,100	994	308
PET.MS0089	8,000	981	304
PET.LA0067	7,800	957	297
PET.OK0111	7,500	920	285
PET.LA0074	7,350	902	280
PET.MT0093	7,000	859	266
PET.NV0105	7,000	859	266
PET.AR0012	6,700	822	255
PET.AR0011	6,200	761	236
PET.TX0151	6,000	736	228
PET.MS0086	5,800	711	221
PET.GA0042	5,540	680	211
PET.CA0035	5,500	675	209
PET.KY0061	5,500	675	209
PET.CA0028	4,000	491	152

TABLE A-49
SIC 2911: PETROLEUM REFINING
FACILITY-SPECIFIC CRUDE OIL CAPACITY DATA

ID number OCID	Crude oil capacity (bbls/day)	Crude oil capacity [a] (million lbs/yr)	Amount of lead (lbs/yr)
PET.AZ0013	3,800	466	145
PET.TX0152	2,000	245	76
PET.TX0134	1,400	172	53
PET.TX0145	1,000	123	38
PET.CA0027		0	0
PET.LA0069		0	0
PET.PA0119		0	0
PET.PR0125		0	0
PET.WA0171		0	0
Total		2,028,560	628,854

a. 350 operating days per year; 42 gallons per barrel; 8.345 lbs/gal

TABLE A-50
SIC 3241: CEMENT, HYDRAULIC
FACILITY-SPECIFIC CLINKER CAPACITY DATA FOR DRY AND WET PROCESS KILNS

Clinker capacity (1000 tons/yr)	Clinker capacity (million lbs/yr)	Emission factor (lbs Pb/ million lbs)	Amount of lead (lbs)
Dry process kilns (131)			
1,669	3,338	80	267,040
1,600	3,200	80	256,000
1,442	2,884	80	230,720
1,364	2,728	80	218,240
1,104	2,208	80	176,640
1,039	2,078	80	166,240
1,000	2,000	80	160,000
987	1,974	80	157,920
963	1,926	80	154,080
954	1,908	80	152,640
858	1,716	80	137,280
845	1,690	80	135,200
800	1,600	80	128,000
775	1,550	80	124,000
775	1,550	80	124,000
760	1,520	80	121,600
759	1,518	80	121,440
750	1,500	80	120,000
724	1,448	80	115,840
722	1,444	80	115,520
651	1,302	80	104,160
651	1,302	80	104,160
650	1,300	80	104,000
617	1,234	80	98,720
610	1,220	80	97,600
600	1,200	80	96,000
600	1,200	80	96,000
600	1,200	80	96,000
600	1,200	80	96,000
593	1,186	80	94,880
593	1,186	80	94,880
590	1,180	80	94,400
589	1,178	80	94,240
571	1,142	80	91,360
560	1,120	80	89,600
503	1,006	80	80,480
500	1,000	80	80,000
498	996	80	79,680
495	990	80	79,200

TABLE A-50
SIC 3241: CEMENT, HYDRAULIC
FACILITY-SPECIFIC CLINKER CAPACITY DATA FOR DRY AND WET PROCESS KILNS

Clinker capacity (1000 tons/yr)	Clinker capacity (million lbs/yr)	Emission factor (lbs Pb/ million lbs)	Amount of lead (lbs)
494	988	80	79,040
481	962	80	76,960
480	960	80	76,800
476	952	80	76,160
475	950	80	76,000
465	930	80	74,400
465	930	80	74,400
465	930	80	74,400
461	922	80	73,760
450	900	80	72,000
450	900	80	72,000
444	888	80	71,040
444	888	80	71,040
410	820	80	65,600
398	796	80	63,680
397	794	80	63,520
391	782	80	62,560
391	782	80	62,560
391	782	80	62,560
391	782	80	62,560
391	782	80	62,560
375	750	80	60,000
375	750	80	60,000
325	650	80	52,000
306	612	80	48,960
306	612	80	48,960
300	600	80	48,000
300	600	80	48,000
300	600	80	48,000
300	600	80	48,000
275	550	80	44,000
275	550	80	44,000
263	526	80	42,080
253	506	80	40,480
253	506	80	40,480
253	506	80	40,480
253	506	80	40,480
253	506	80	40,480
253	506	80	40,480
248	496	80	39,680
248	496	80	39,680

TABLE A-50
SIC 3241: CEMENT, HYDRAULIC
FACILITY-SPECIFIC CLINKER CAPACITY DATA FOR DRY AND WET PROCESS KILNS

Clinker capacity (1000 tons/yr)	Clinker capacity (million lbs/yr)	Emission factor (lbs Pb/ million lbs)	Amount of lead (lbs)
248	496	80	39,680
248	496	80	39,680
247	494	80	39,520
247	494	80	39,520
241	482	80	38,560
241	482	80	38,560
241	482	80	38,560
241	482	80	38,560
241	482	80	38,560
235	470	80	37,600
235	470	80	37,600
235	470	80	37,600
234	468	80	37,440
234	468	80	37,440
234	468	80	37,440
229	458	80	36,640
229	458	80	36,640
229	458	80	36,640
225	450	80	36,000
225	450	80	36,000
225	450	80	36,000
223	446	80	35,680
223	446	80	35,680
223	446	80	35,680
223	446	80	35,680
223	446	80	35,680
208	416	80	33,280
207	414	80	33,120
165	330	80	26,400
165	330	80	26,400
164	328	80	26,240
164	328	80	26,240
164	328	80	26,240
164	328	80	26,240
164	328	80	26,240
164	328	80	26,240
164	328	80	26,240
156	312	80	24,960
156	312	80	24,960
156	312	80	24,960
156	312	80	24,960

TABLE A-50
SIC 3241: CEMENT, HYDRAULIC
FACILITY-SPECIFIC CLINKER CAPACITY DATA FOR DRY AND WET PROCESS KILNS

Clinker capacity (1000 tons/yr)	Clinker capacity (million lbs/yr)	Emission factor (lbs Pb/ million lbs)	Amount of lead (lbs)
131	262	80	20,960
131	262	80	20,960
131	262	80	20,960
131	262	80	20,960
84	168	80	13,440
84	168	80	13,440
84	168	80	13,440
84	168	80	13,440
55	110	80	8,800
55	110	80	8,800
Wet process kilns (71)			
1,312	2,624	60	157,440
766	1,532	60	91,920
766	1,532	60	91,920
715	1,430	60	85,800
660	1,320	60	79,200
610	1,220	60	73,200
600	1,200	60	72,000
558	1,116	60	66,960
546	1,092	60	65,520
546	1,092	60	65,520
512	1,024	60	61,440
504	1,008	60	60,480
492	984	60	59,040
485	970	60	58,200
485	970	60	58,200
473	946	60	56,760
455	910	60	54,600
425	850	60	51,000
394	788	60	47,280
352	704	60	42,240
337	674	60	40,440
337	674	60	40,440
314	628	60	37,680
314	628	60	37,680
314	628	60	37,680
314	628	60	37,680
312	624	60	37,440
302	604	60	36,240
301	602	60	36,120

TABLE A-50
SIC 3241: CEMENT, HYDRAULIC
FACILITY-SPECIFIC CLINKER CAPACITY DATA FOR DRY AND WET PROCESS KILNS

Clinker capacity (1000 tons/yr)	Clinker capacity (million lbs/yr)	Emission factor (lbs Pb/ million lbs)	Amount of lead (lbs)
301	602	60	36,120
301	602	60	36,120
300	600	60	36,000
300	600	60	36,000
300	600	60	36,000
300	600	60	36,000
300	600	60	36,000
282	564	60	33,840
282	564	60	33,840
280	560	60	33,600
274	548	60	32,880
274	548	60	32,880
274	548	60	32,880
248	496	60	29,760
248	496	60	29,760
245	490	60	29,400
245	490	60	29,400
225	450	60	27,000
225	450	60	27,000
218	436	60	26,160
218	436	60	26,160
217	434	60	26,040
217	434	60	26,040
211	422	60	25,320
202	404	60	24,240
202	404	60	24,240
191	382	60	22,920
191	382	60	22,920
185	370	60	22,200
185	370	60	22,200
185	370	60	22,200
184	368	60	22,080
164	328	60	19,680
164	328	60	19,680
158	316	60	18,960
158	316	60	18,960
155	310	60	18,600
155	310	60	18,600
105	210	60	12,600
105	210	60	12,600
99	198	60	11,880
81	162	60	9,720

TABLE A-51
SIC 4953: REFUSE SYSTEMS
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
ALD000622464	91,283	182,566
ALD000622464	91,283	182,566
ALD981019045	250	500
ALD981019045	250	500
ARD069748192	19,538	39,076
ARD069748192	19,538	39,076
CTD000604488	646	1,292
CTD000604488	646	1,292
CTD072138969	11	22
CTD072138969	11	22
GAD096629282	2,691	5,382
GAD096629282	2,691	5,382
IDD073114654	120,722	241,444
IDD073114654	120,722	241,444
ILD000608471	1,473	2,946
ILD000608471	1,473	2,946
ILD000666206	387	774
ILD000666206	387	774
ILD000805812	34,753	69,506
ILD000805812	34,753	69,506
ILD040891368	945,143	1,890,286
ILD040891368	945,143	1,890,286
ILD085349264	5	10
ILD085349264	5	10
ILD098642424	11,479	22,958
ILD098642424	11,479	22,958
ILD984766279	750	1,500
ILD984766279	750	1,500
IND005081542	4	8
IND005081542	4	8
IND006419212	0	0
IND006419212	0	0
IND078911146	1,459,776	2,919,552
IND078911146	1,459,776	2,919,552

TABLE A-51
SIC 4953: REFUSE SYSTEMS
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
IND093219012	94,143	188,286
IND093219012	94,143	188,286
KSD980633259	2,894	5,788
KSD980633259	2,894	5,788
KYD088438817	2,439	4,878
KYD088438817	2,439	4,878
LAD000777201	51,846	103,692
LAD000777201	51,846	103,692
LAD010395127	0	0
LAD010395127	0	0
LAD981057706	19	38
LAD981057706	19	38
MAD053452637	6,161	12,322
MAD053452637	6,161	12,322
MDD980555189	13,598	27,196
MDD980555189	13,598	27,196
MID000724831	858,318	1,716,636
MID000724831	858,318	1,716,636
MID057002602	61	122
MID057002602	61	122
MID074259565	0	0
MID074259565	0	0
MID096963194	50,499	100,998
MID096963194	50,499	100,998
MID098011992	3,025	6,050
MID098011992	3,025	6,050
MSD077655876	200	400
MSD077655876	200	400
NCD000773655	0	0
NCD000773655	0	0
NCD121700777	4,573	9,146
NCD121700777	4,573	9,146
NED981723513	18	36
NED981723513	18	36

TABLE A-51
SIC 4953: REFUSE SYSTEMS
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
NJD002200046	10	20
NJD002200046	10	20
NJD002385730	1,230	2,460
NJD002385730	1,230	2,460
NJD053288239	954	1,908
NJD053288239	954	1,908
NJD991291105	290,867	581,734
NJD991291105	290,867	581,734
NYD048148175	0	0
NYD048148175	0	0
NYD049836679	189,851	379,702
NYD049836679	189,851	379,702
NYD057770109	253	506
NYD057770109	253	506
NYD080336241	14,016	28,032
NYD080336241	14,016	28,032
OHD000724153	1,306	2,612
OHD000724153	1,306	2,612
OHD000816629	3,787	7,574
OHD000816629	3,787	7,574
OHD004178612	769	1,538
OHD004178612	769	1,538
OHD004274031	299	598
OHD004274031	299	598
OHD005048947	349	698
OHD005048947	349	698
OHD020273819	3,424	6,848
OHD020273819	3,424	6,848
OHD045243706	1,382,582	2,765,164
OHD045243706	1,382,582	2,765,164
OHD048415665	10,267	20,534
OHD048415665	10,267	20,534
OHD055522429	39,903	79,806
OHD055522429	39,903	79,806

TABLE A-51
SIC 4953: REFUSE SYSTEMS
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
OHD081290611	1,283	2,566
OHD081290611	1,283	2,566
OHD083377010	0	0
OHD083377010	0	0
OHD093945293	1,042	2,084
OHD093945293	1,042	2,084
OHD980568992	225,221	450,442
OHD980568992	225,221	450,442
OHD980587364	250	500
OHD980587364	250	500
OHD980613541	470	940
OHD980613541	470	940
OKD065438376	4,635	9,270
OKD065438376	4,635	9,270
PAD002389559	250	500
PAD002389559	250	500
PAD002390961	0	0
PAD002390961	0	0
PAD002395887	2,064,435	4,128,870
PAD002395887	2,064,435	4,128,870
PAD004835146	1,572,682	3,145,364
PAD004835146	1,572,682	3,145,364
PAD010154045	138,570	277,140
PAD010154045	138,570	277,140
PAD085690592	198,340	396,680
PAD085690592	198,340	396,680
PRD090399718	6	12
PRD090399718	6	12
RID040098352	0	0
RID040098352	0	0
RID980906986	200	400
RID980906986	200	400
SCD003368891	22,766	45,532
SCD003368891	22,766	45,532

TABLE A-51
SIC 4953: REFUSE SYSTEMS
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
SCD044442333	250	500
SCD044442333	250	500
SCD070375985	1,052,762	2,105,524
SCD070375985	1,052,762	2,105,524
SCD981467616	0	0
SCD981467616	0	0
TND000772277	2,171	4,342
TND000772277	2,171	4,342
TND981922826	0	0
TND981922826	0	0
TND982144099	733,462	1,466,924
TND982144099	733,462	1,466,924
TXD000838896	190,316	380,632
TXD000838896	190,316	380,632
TXD008117186	62,500	125,000
TXD008117186	62,500	125,000
TXD055141378	5	10
TXD055141378	5	10
VAD077942266	0	0
VAD077942266	0	0
VAD098443443	374	748
VAD098443443	374	748
VAD988175055	330	660
VAD988175055	330	660
WID003967148	80,305	160,610
WID003967148	80,305	160,610
Total		48,276,788

a. The number of facilities was doubled because TRI data may underestimate the number of reporting facilities; TRI-subject hazardous waste facilities that receive wastes only from non-TRI facilities would not appear in TRI.
b. The amount of lead per facility was doubled because TRI data may underestimate the amount of the chemical; it does not include transfers that the hazardous waste facility may receive from non-TRI facilities, or transfers from TRI facilities for chemicals that did not exceed current reporting thresholds.

TABLE A-52
SIC 7389: SOLVENT RECOVERY SERVICES
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
ALD070513767	250	500
ALD070513767	250	500
ALD094476793	0	0
ALD094476793	0	0
GAD093380814	0	0
GAD093380814	0	0
ILD980613913	2	4
ILD980613913	2	4
IND000780403	45	90
IND000780403	45	90
KYD053348108	23,845	47,690
KYD053348108	23,845	47,690
MAD019371079	59,100	118,200
MAD019371079	59,100	118,200
MAD053452637	6,161	12,322
MAD053452637	6,161	12,322
MID060975844	61	122
MID060975844	61	122
MID980615298	4,236	8,472
MID980615298	4,236	8,472
NJD002182897	365	730
NJD002182897	365	730
NJD002454544	659	1,318
NJD002454544	659	1,318
OHD004178612	769	1,538
OHD004178612	769	1,538
OHD066060609	4,965	9,930
OHD066060609	4,965	9,930
OHD093945293	1,042	2,084
OHD093945293	1,042	2,084
OHD980587364	250	500
OHD980587364	250	500
SCD036275626	3,739	7,478
SCD036275626	3,739	7,478

TABLE A-52
SIC 7389: SOLVENT RECOVERY SERVICES
FACILITY-SPECIFIC DATA FOR LEAD AND LEAD COMPOUNDS

EPA ID [a]	Amount of lead (pounds)	Adjusted amount of lead [b] (pounds)
SCD077995488	6,421	12,842
SCD077995488	6,421	12,842
TXD077603371	5,430	10,860
TXD077603371	5,430	10,860
WID000808824	780	1,560
WID000808824	780	1,560
Total		472,480

a. The number of facilities was doubled because TRI data may underestimate the number of reporting facilities; TRI-subject hazardous waste facilities that receive wastes only from non-TRI facilities would not appear in TRI.
b. The amount of lead per facility was doubled because TRI data may underestimate the amount of the chemical; it does not include transfers that the hazardous waste facility may receive from non-TRI facilities, or transfers from TRI facilities for chemicals that did not exceed current reporting thresholds.

APPENDIX B
NUMBER OF ADDITIONAL REPORTS AND AFFECTED FACILITIES: LEAD AND PBT PROPOSALS[55]

On January 5, 1999 EPA proposed to modify reporting requirements for TRI chemicals that persist and bioaccumulate in the environment, add certain toxic chemicals to the list of reportable substances, and modify other reporting requirements for persistent bioaccumulative toxic (PBT) chemicals. The purpose of this appendix is to estimate the total number of additional reports and affected facilities resulting from the proposed lead and PBT rules.[56]

The reporting threshold options for which results are shown consist of 1) the preferred reporting thresholds for PBT chemicals, and 2) reporting thresholds for lead and lead compounds of 1, 10, 100, or 1,000 lbs:

- Option 1 - 10 lbs for the highly PBT chemicals; 100 lbs for PBT chemicals; 0.1 grams for dioxin and dioxin-like compounds; and 1 lb for lead and lead compounds.
- Option 2 - 10 lbs for the highly PBT chemicals; 100 lbs for PBT chemicals; 0.1 grams for dioxin and dioxin-like compounds; and 10 lbs for lead and lead compounds.
- Option 3 - 10 lb for the highly PBT chemicals; 100 lbs for PBT chemicals; 0.1 grams for dioxin and dioxin-like compounds; and 100 lb for lead and lead compounds.
- Option 4 - 10 lbs for the highly PBT chemicals; 100 lbs for PBT chemicals; 0.1 grams for dioxin and dioxin-like compounds; and 1,000 lb for lead and lead compounds.

[55] EPA does not believe that it is required by statute or executive order to prepare the following analysis. The information presented on the potential for certain facilities to be affected by the proposed lead rule and the proposed PBT rule (January 5, 1999; 64 FR 688) is only intended for informational purposes. The proposed PBT rule and this proposed rule to lower thresholds for lead and lead compounds are two distinct proposed rules, and any changes made by EPA when finalizing one rule will not necessarily affect the other rule.

[56] The term "affected facilities" denotes facilities that meet the revised TRI reporting requirements and are expected to submit at least one Form R for a PBT chemical or lead and lead compounds. Additional facilities in an SIC code may be required to perform compliance determination activities if their industry group is subject to TRI reporting. Facilities may submit more than one Form R if they manufacture, process, or otherwise use more than one listed TRI chemical. The number of facilities performing compliance activities, and their attendant costs, are estimated in Chapter 4.

The estimates of total additional reporting and affected facilities are used to calculate the total potential costs of the two proposals (see Appendix C), to evaluate the total potential impacts on small entities of the two proposals (see Appendix D), and to estimate the total number of facilities that are potentially affected by both proposals. Section B.1 presents the estimated number of reports. Section B.2 presents the estimated number of affected facilities. In Section B.3, the number of overlapping affected facilities under the two proposals is derived.

B.1 ESTIMATED NUMBER OF ADDITIONAL REPORTS

The number of additional reports expected to be filed by each industry group was estimated for the four options listed above.[57] The best estimate of the number of additional reports for each chemical (PBT and lead) is presented by option in Table B-1. Numbers of reports expected to be filed by each industry group under each option are presented in Table B-2. Option 1 corresponds with the proposed option for the PBT chemicals and the lowest reporting threshold for lead, while Option 4 corresponds with the proposed option for the PBT chemicals and the highest reporting threshold for lead. As shown in both tables, the number of expected reports decreases as the reporting thresholds increase.

[57] For PBT chemicals, see Appendices A through M of the "Economic Analysis of the Proposed Rule to Modify Reporting of Persistent Bioaccumulative Toxic Chemicals Under EPCRA Section 313," Dec 99. For lead and lead compounds, see Appendix A of this report.

TABLE B-1
NUMBERS OF REPORTS EXPECTED FOR EACH CHEMICAL:
LEAD AND PBT PROPOSALS

Chemical	Numbers of Reports			
	Option 1	**Option 2 (Preferred)**	**Option 3**	**Option 4**
Alkyl Leads: Tetraethyl & Tetramethyl Lead	134	134	134	134
Benzo(g,h,i)perylene	353	353	353	353
Dioxins and Furans	1,863	1,863	1,863	1,863
Hexachlorobenzene	778	778	778	778
Lead and Lead Compounds	22,623	15,043	8,762	2,905
Mercury and Mercury Compounds	5,230	5,230	5,230	5,230
Octachlorostyrene	230	230	230	230
Pesticides	264	264	264	264
Pentachlorobenzene	707	707	707	707
Polychlorinated Biphenyls (PCBs)	2,267	2,267	2,267	2,267
Polycyclic Aromatic Compounds Category	4,699	4,699	4,699	4,699
Tetrabromobisphenol A	150	150	150	150
Vanadium and Vanadium Compounds	654	654	654	654
TOTAL	**39,952**	**32,372**	**26,091**	**20,234**

B.2 ESTIMATED NUMBER OF AFFECTED FACILITIES

By analyzing industry sectors from which reporting may occur, the number of facilities expected to file a report for each of the chemicals listed in Table B-1 was estimated. Industry sectors potentially affected by the two rules include:

- Metal mining (SIC code 10)
- Coal mining (SIC code 12)
- Electric services (SIC code 4911)
- Electric and other services (SIC code 4931)
- Combination utilities (SIC code 4939)
- RCRA subtitle C hazardous waste facilities (SIC code 4953)
- Chemical and allied products-wholesale (SIC code 5169)

- Petroleum bulk stations & terminals (SIC code 5171)
- Solvent recyclers (SIC code 7389)
- Manufacturing (SIC codes 20 -39)

The methodology used to estimate the number of additional lead reports is presented in Appendix A of this report. The methodology used to estimate the number of additional reports for PBT chemicals is presented in Appendices A through M of the "Economic Analysis of the Proposed Rule to Modify Reporting of Persistent Bioaccumulative Toxic Chemicals Under EPCRA Section 313" (known hereafter as the PBT EA). Each chemical-specific appendix presents an estimate of the number of facilities in an industry group that may submit additional reports on that chemical. Because numbers of reports and numbers of facilities were estimated separately for each chemical, the unique number of facilities expected to file reports is less than the sum of facilities across chemicals. Using a hypothetical example, assume that 200 coal mines may be expected to report on mercury and mercury compounds. Assume that 100 coal mines may also be expected to report on lead and lead compounds. The total number of unique facilities filing one or more chemical reports to TRI due to the proposed rules, however, could be 200 facilities, 300 facilities, or some number in between depending on the degree of overlap between facilities reporting on the different chemicals.

To estimate the costs of the rule (see Appendix C), it was necessary to estimate the *unique* number of facilities expected to report under each option. Methodologies were developed for estimating the unique number of facilities from each industry group. These methodologies are described below.

Metal Mining (SIC Code 10)

As shown in the PBT EA appendices and Appendix A of this report, metal mining facilities are expected to file a maximum of one additional report per facility for mercury. As facilities are only required to file one report per chemical, the unique number of facilities from this SIC code equals the number of reports filed for mercury.

Coal Mining (SIC Code 12)

The PBT EA appendices and Appendix A of this report indicate that all potential reporters in SIC code 12 will file additional reports for two chemicals: mercury and lead. Therefore, for this SIC code, the unique number of facilities expected to report under all options is known to be 321, and the number of reports filed per facility is two.

Electric Services (SIC Code 4911)

For SIC code 4911, data on fuel throughput and chemical concentration by fuel type were used to estimate the unique number of coal- and oil-burning facilities expected to report. For each facility, the chemical concentration in a given fuel was multiplied by the throughput of that fuel to calculate the amount of each chemical manufactured or otherwise used. By comparing this amount to the relevant threshold, it was possible to estimate the unique number of facilities reporting at each option, as well as the number of reports each facility would submit.

Electric and Other Services (SIC Code 4931) and Combination Utilities (SIC Code 4939)

For SIC codes 4931 and 4939, information on expected reporting in SIC code 4911 was used. To estimate the total number of facilities reporting on each chemical in SIC codes 4931 and 4939, the percentage of facilities in SIC code 4911 exceeding each threshold was applied to the number of facilities in SIC codes 4931 and 4939. This was done separately for coal- and oil-burning facilities.

A distribution of reports per facility was developed by ordering chemicals according to their concentration in both fuel types (coal and residual oil). Because reporting is directly related to fuel throughput, the number of reports associated with each chemical increases as chemical concentrations increase. By examining the change in the expected number of reports between chemicals, it was possible to estimate the number of facilities filing each possible number of reports per facility.

Using a hypothetical example, assume that facilities in SIC code 4931 are expected to report on a maximum of three chemicals. Assume 50 facilities file reports for mercury, 60 facilities file reports for PACs and 100 facilities file reports for lead. As the number of reports is based on throughput and concentration data, the chemical with the lowest number of reports has the lowest concentration. If a facility files a report for the chemical with the lowest concentration, it will also file reports for every chemical with a higher concentration. As such, 50 facilities would file three reports each, 10 facilities (60 - 50) would file two reports each, and 40 facilities (100 - 60) would file one report each.

The distribution of reports per facility, developed as described above, was applied to the best estimate of total reports for each SIC code. The number of unique facilities expected to report was estimated by dividing the number of reports by the number of reports per facility and summing across the distribution.

Petroleum Bulk Stations & Terminals (SIC Code 5171)

For SIC code 5171, data on fuel throughput and chemical concentration by fuel type were used to identify the unique number of facilities expected to file reports for each chemical. A distribution of reports per facility was developed by ordering chemicals according to their concentration in fuels. The distribution of total reports and the number of unique facilities were estimated using the same methodology described above for SIC codes 4931 and 4939.

Manufacturing (SIC Codes 20-39); RCRA Subtitle C Hazardous Waste Facilities (SIC Code 4953); Chemical and Allied Products-Wholesale (SIC Code 5169); and Solvent Recyclers (SIC Code 7389)

For all other industry groups, the unique number of facilities was estimated through a multi-step process. First, it is assumed that the distribution of PBT and lead reports per facility will be similar to the distribution of reports per facility for all other TRI chemicals. Second, for each industry group, a distribution of reports per facility was predicted, based on data for facilities currently reporting to TRI. Third, a distribution of total reports was developed for each

industry group from the distribution of reports per facility and the best estimate of total reports. Finally, the number of reports was divided by the number of reports per facility to estimate the number of unique facilities.

The 1996 TRI data were analyzed to determine the distribution of facilities by the number of reports filed per facility. There were 21,626 facilities that submitted 71,281 reports to TRI in 1996. Of these, 8,272 filed a single report, 4,302 facilities filed two reports, 3,153 facilities filed three reports, and so on. This distribution of *facilities* was used to develop a parallel distribution of *reports*.

Thus, 8,272 reports (8,272 facilities x 1 report per facility), or 11.6% of all reports (8,272 / 71,381), were filed by facilities filing one report per facility; 8,604 reports (4,302 facilities x 2 reports per facility), or 12.1% of all reports (8,604 / 71,381), were filed by facilities filing two reports per facility; etc. This distribution of reports consisted of 54 observations, one observation for each different number of reports per facility.

The TRI distribution of reports per facility was divided into segments according to the maximum number of PBT chemicals (and lead) associated with each industry group. For example, the chemical specific appendices predict that 21 reports will be filed by facilities in SIC code 5169 (chemical wholesalers) under Option 2, and that these facilities will file a maximum of three reports per facility. The TRI distribution of reports was divided into three equal segments, each representing one, two, or three reports per facility. Within each segment, the percentages of reports per facility are summed to create a new fitted distribution. In this example, the first 18 observations (54 /3 = 18) are summed to represent the percent of reports filed by chemical wholesalers filing one report. This percentage equals 88.1%. The sum of the second 18 observations, or 9.9%, represent the percent of reports filed by chemical wholesalers filing two reports. The sum of the third 18 observations, or 2.0%, represent the percent of reports filed by chemical wholesalers filing three reports.

This fitted distribution of reports per facility was applied to the best estimate of total reports for each SIC code. The number of unique facilities expected to report was estimated by dividing the number of reports by the number of reports per facility and summing across the distribution. For industry groups where the application of the fitted distribution yielded an estimated number of unique facilities that exceeds the maximum number of potential reporters, the number of unique facilities was capped at the maximum.

Calculation of rule familiarization costs also requires the estimation of the number of unique facilities that will be reporting to TRI for the first time, since only first time reporters will incur this cost (see Appendix C). Under these proposals, it is expected that first time filers will be limited to the manufacturing sector (SIC Codes 20 -39). All of the facilities in the non-manufacturing industry groups expected to report under the proposed rules for PBT chemicals and lead and lead compounds are expected to file for other TRI chemicals in prior years.

To generate an estimate of first time filers it is assumed that the distribution of reports per facility will not change after either or the proposed rules are promulgated. It is further assumed that if a facility files a single report, and it is for a PBT chemical or lead, then the facility must be new to the TRI system. Therefore, the unique number of facilities submitting reports for PBT chemicals and lead, calculated as described above, is multiplied by the percentage of reporters that filed only one report in 1996 (38.3%). Figure 3-1 in Chapter 3 indicates that when the two rules are considered together, 5,908 facilities would be considered first time filers under the preferred options. Table B-2 presents the number of unique facilities, first time filers and number of reports by industry group and by option.

TABLE B-2
NUMBERS OF UNIQUE FACILITIES AND REPORTS
BY INDUSTRY GROUP:
LEAD AND PBT PROPOSALS

	Option 1			Option 2 (Preferred Option)			Option 3			Option 4		
Industry Group	**Number of Unique Facilities**	**Number of First Time Filers**	**Number of Reports**	**Number of Unique Facilities**	**Number of First Time Filers**	**Number of Reports**	**Number of Unique Facilities**	**Number of First Time Filers**	**Number of Reports**	**Number of Unique Facilities**	**Number of First Time Filers**	**Number of Reports**
SIC 10	60	0	60	60	0	60	60	0	60	60	0	60
SIC 12	321	0	642	321	0	642	321	0	642	321	0	642
SIC 4911	511	0	2,356	511	0	2,337	511	0	2,306	508	0	2,267
SIC 4931	291	0	1,291	291	0	1,276	291	0	1,252	291	0	1,224
SIC 4939	33	0	138	33	0	136	33	0	132	33	0	128
SIC 4953	162	0	352	162	0	346	162	0	336	162	0	308
SIC 5169	20	0	21	20	0	21	20	0	21	20	0	21
SIC 5171	2,459	0	5,207	1,229	0	3,728	1,229	0	3,369	1,229	0	2,803
SIC 7389	120	0	142	118	0	140	116	0	138	109	0	130
SIC 20-39	19,370	7,419	29,743	15,425	5,908	23,686	11,615	4,449	17,835	8,239	3,156	12,651
TOTAL	23,347	7,419	39,952	18,170	5,908	32,372	14,358	4,449	26,091	10,972	3,156	20,234

B.3 DERIVATION OF THE NUMBER OF OVERLAPPING FACILITIES BETWEEN THE PROPOSED PBT RULE AND THE PROPOSED LEAD RULE

As mentioned in Chapter 3, when the proposed lead rule is analyzed incrementally from current reporting, some of the facilities counted as "affected" by the proposed lead rule may also be "affected" by the PBT proposal for one of the following two reasons:

- The facility does not currently report to TRI but is expected to file a report as a result of the proposed lead rule and one or more reports as a result of the proposed PBT rule. Therefore, the facility is considered a first time filer in the economic analysis of each rule.

- The facility currently reports to TRI and is expected to file a report as a result of the proposed lead rule and one or more reports as a result of the proposed PBT rule. Therefore, the facility is considered a current filer in the economic analysis of each rule.

The derivation of the number of each type of overlapping facility is described in the following sections:

Universe of Facilities

As shown in the PBT EA, Chapter 3 of this EA, and the preceding sections:

Number of affected facilities: Lead proposal (preferred option)

	5,081 (first time filers)
+	9,962 (current filers)
=	15,043 facilities

Number of affected facilities: PBT proposal (preferred option)

	2,600 (first time filers)
+	6,915 (current filers)
=	9,515 facilities

Total number of affected facilities: Lead and PBT proposals (preferred options)

	5,908 (first time filers)
+	12,262 (current filers)
=	18,170 facilities

Overlapping First Time Filers

As indicated above, the total number of first time filers under the two proposed rules is 5,908 facilities. By subtracting out the number of first time filers under the proposed PBT rule (2,600), the number of the new filers under the two proposed rules filing lead reports only is estimated to be 3,308 (5,908 - 2,600 = 3,308). If these 3,308 new facilities filing lead reports only are then subtracted from the total number of first time filers under the lead rule (5,081), the number of new filers under the lead rule who are expected to report on PBT chemicals (1,773) can be calculated (5,081 - 3,308 = 1,773). As these 1,773 facilities are expected to report on lead and one or more PBT chemicals, they represent the overlap in first time filers between the two rules.

Overlapping Current Filers

As indicated above, the total number of unique filers when the two proposals are considered together is 18,170 facilities. By subtracting out the total number of facilities expected to file under the proposed PBT rule (9,515) and the number of new filers under the two proposed rules filing lead reports only (3,308), the number of current filers under the two proposed rules that are only reporting on lead can be estimated (18,170 - 9,515 - 3,308 = 5,347). If these 5,347 facilities are then subtracted from the 9,962 total current filers under the proposed lead rule, the number of current filers under the lead rule who also report on PBT chemicals (4,615) can be estimated (9,962 - 5,347 = 4,615). As these 4,615 facilities are expected to report on lead and one or more PBT chemicals, they represent the overlap in current filers between the two rules.

In summary:

	15,043 (total facilities under the lead rule)
+	9,515 (total facilities under the PBT rule)
	1,773 (overlapping new filers)
	4,615 (overlapping current filers)
=	18,170 unique facilities affected by the lead and PBT proposals

APPENDIX C
ESTIMATED COSTS: LEAD AND PBT PROPOSALS[58]

This chapter estimates the costs that may be incurred as a result of the proposed lead rule and the proposed PBT rule. Section C.1 describes the methodology used to estimate total costs to industry. Section C.2 details the estimated costs to EPA of implementing the expanded program. Section C.3 summarizes the total costs. Section C.4 presents the cost implications of the overlap in the number of affected facilities when the proposed lead and PBT rules are analyzed separately.

C.1 INDUSTRY COST ESTIMATES

In this section, the costs that may be incurred by industry as a result of the proposed lead rule and the proposed PBT rule are estimated. These costs are presented for four reporting threshold options (see Appendix B for a description of the four options). Section C.1.1 describes the methodology used to estimate total industry costs for each option. Section C.1.2 discusses the unit cost estimates for each of the activities that a facility may need to perform to comply with the section 313 reporting requirements. Section C.1.3 presents the total cost estimate of each option for industry. Section C.1.4 discusses the costs incurred by publicly-owned electric utilities. Finally, Section C.1.5 describes the transfer payments and non-monetized costs associated with these rulemakings.

C.1.1 METHODOLOGY

Total industry costs were calculated using the following four-step procedure:

Step 1: Identify and describe the tasks that potentially affected facilities will have to perform to comply with the section 313 requirements.

Step 2: For each task, estimate the hours of managerial, technical, and clerical labor needed to complete it. Based on typical labor rates, calculate the unit cost of each task for the first year of compliance, when some learning must take place, and subsequent years, when less time is needed because facilities are more familiar with the tasks.

[58] EPA does not believe that it is required by statute or executive order to prepare the following analysis. The information presented on the potential for certain facilities to be affected by the proposed lead rule and the proposed PBT rule (January 5, 1999; 64 FR 688) is only intended for informational purposes. The proposed PBT rule and this proposed rule to lower thresholds for lead and lead compounds are two distinct proposed rules, and any changes made by EPA when finalizing one rule will not necessarily affect the other rule.

Step 3: Estimate the number of unique facilities that will perform each task. Estimate the number of facilities that will perform some portion of the required tasks in order to determine that they do not have to comply with the reporting requirements. Estimate the number of reports to be filed in each industry group.

Step 4: For each task, multiply the unit cost by the number of unique facilities and/or reports, and then sum the results to compute the total industry costs for the first year and subsequent years.

The tasks associated with TRI reporting include:

- **Compliance Determination:** Facilities must determine whether they meet the criteria for reporting on the PBT chemicals and lead and lead compounds at the lower thresholds. This task includes the time required to review the list of PBT chemicals, to become familiar with the definitions, exemptions, and new threshold requirements under the TRI program, and to conduct preliminary threshold calculations to determine if the facility is required to report.

- **Rule Familiarization:** Facilities that are reporting under section 313 for the first time due to the proposed rules must read the reporting package and become familiar with the reporting requirements.

- **Report Completion:** Facilities must gather data and perform calculations to provide the information required on the form.

- **Mailing and Recordkeeping:** Facilities must maintain recordkeeping systems and mail the report to EPA and the State.

- **Supplier Notification:** Facilities supplying mixtures and trade name products containing newly listed PBT chemicals above *de minimis* levels must notify their customers of the contents of their products on an annual basis.[59]

The skills required to comply with the section 313 reporting requirements (including the requirements associated with section 6607 of the PPA) will vary from facility to facility depending upon factors such as the complexity of the facility's processes, the type of use and disposition of PBT chemicals and lead and lead compounds at the facility, and transfers from the facility. Those responsible for reporting may often have engineering, scientific, or technical backgrounds. Compliance does not, however, necessarily require an engineering or other similar degree. At a minimum, an understanding of the facility's chemical purchases and production processes is required. Necessary skills may include the ability to evaluate and interpret records, understand material safety data sheets, and determine throughput or production volumes. Depending on the facility, estimates may be calculated using existing data collected under

[59] Lead and lead compounds are currently listed TRI chemicals. Therefore, supplier notification costs incurred by facilities supplying mixtures and trade name products containing lead and lead compounds above *de minimis* levels are considered to be existing costs and are not attributed to the proposed lead rule.

federal, state, or local regulations; emissions factors; design data supplied by the equipment manufacturer; mass balance techniques; or engineering calculations. Each technique requires varying skills and levels of sophistication to complete. In some instances, EPA guidance documents may supplant the need for a particular skill.

The next section discusses how the unit cost associated with each of these specific tasks was estimated.

C.1.2 UNIT COST ESTIMATES

This section explains how the cost estimates, or unit costs, were developed for each task that facilities might have to perform to comply with the proposed rules. Depending on whether the unit cost is report- or facility-specific, total costs for a task can be calculated by multiplying the unit cost by the number of reports for which the task must be performed or by the number of facilities performing it. The estimated number of unique facilities and chemical reports expected under each regulatory option is presented in Table C-1. The estimated unit cost for each of the tasks is presented in Table C-2.

Each cost estimate is made up of two components: the unit time estimates (i.e., number of labor hours required of each type of personnel to complete a task); and the hourly wage rates for each level of personnel. The unit time estimates are taken from the Economic Analysis (EA) of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (USEPA, 1997).

Hourly wage rates are divided into three categories: managerial, technical, and clerical. Updated 1998 hourly labor rates, including fringe benefits and overhead, were developed by EPA for each of these categories using the same methodology used in the Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (USEPA, 1997). The new wage rates were calculated using current data on salaries and benefits for these three labor categories.

TABLE C-1
ESTIMATED NUMBER OF UNIQUE FACILITIES AND CHEMICAL REPORTS: LEAD AND PBT PROPOSALS

SIC Code	Option 1		Option 2 (Preferred Option)		Option 3		Option 4	
	Unique Facilities Reporting	Number of Reports	Unique Facilities Reporting	Number of Reports	Unique Facilities Reporting	Number of Reports	Unique Facilities Reporting	Number of Reports
10 — Metal Mining (except 1011, 1081, 1094)	60	60	60	60	60	60	60	60
12 — Coal Mining (except 1241)	321	642	321	642	321	642	321	642
4911—Electric Services (Coal and Oil Facilities Only)	511	2,356	511	2,337	511	2,306	508	2,267
4931—Electric & Other Services (Coal and Oil Facilities Only)	291	1,291	291	1,276	291	1,252	291	1,224
4939—Combination Utilities (Coal and Oil Facilities Only)	33	138	33	136	33	132	33	128
4953 — RCRA Subtitle C TSDFs Only	162	352	162	346	162	336	162	308
5169 — Chemical Wholesalers	20	21	20	21	20	21	20	21
5171 — Bulk Petroleum	2,459	5,207	1,229	3,728	1,229	3,369	1,229	2,803
7389 — Solvent Recovery Only	120	142	118	140	116	138	109	130
20-39 — Manufacturing Facilities	19,370	29,743	15,425	23,686	11,615	17,835	8,239	12,651
TOTAL	**23,347**	**39,952**	**18,170**	**32,372**	**14,358**	**26,091**	**10,972**	**20,234**

TABLE C-2
UNIT TIME AND COST ESTIMATES FOR ACTIVITIES PERFORMED BY INDUSTRY

Activity	Unit Time Estimates (Hours) (per report or per facility)			Unit Cost[a] (1998 Dollars)
	Managerial	Technical	Clerical	
First Year				
Rule Familiarization[b]	12.0	22.5	0.0	$2,489
Compliance Determination[b]	4.0	12.0	0.0	$1,119
Form R Completion[c]	20.9	45.2	2.9	$4,796
Recordkeeping/Mailing[c]	0.0	4.0	1.0	$283
Supplier Notification[b]	0.0	7.0	17.0	$886
Subsequent Years				
Compliance Determination[b]	1.0	3.0	0.0	$280
Form R Completion[c]	14.3	30.8	2.0	$3,274
Recordkeeping/Mailing[c]	0.0	4.0	1.0	$283
Supplier Notification[b]	0.0	7.0	17.0	$886

[a] Based on loaded hourly wage rates of $86.86, $64.30, and $25.63 for managerial, technical, and clerical labor, respectively.

[b] The unit cost for this activity is estimated at the facility level. It is treated as a fixed cost that does not vary with the number of chemicals handled or reported by a facility.

[c] The unit cost for this activity is estimated to vary with the number of reports submitted. The total cost for this activity at a facility is calculated by multiplying the unit cost by the number of reports submitted by that facility.

Sources: U.S. EPA (1997). *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting*. April.

Wage data used in developing the basic wage rates for this analysis were derived from 1996 wage information published by the Bureau of Labor Statistics (BLS) for all goods-producing, private industries (USDL, 1998). The managerial, technical, and clerical wage rates are based on wage information for four BLS occupation categories: engineers, accountants, attorneys, and secretaries. As presented in Table C-3, the managerial and technical level wage rates are composites of the BLS wage rates for several occupation categories and levels. The managerial level wage rate is a composite of the wage rates of Engineers (levels VI-VIII),

TABLE C-3
LOADED HOURLY WAGE RATES BY LABOR CATEGORY

Labor Category	Occupation (levels)	June 1996 Average Salary	Weighting Factor	1996 Composite Salary	ECI Ratio 6/96:3/98	1998 Adjusted Salary	1997 Benefits (% Salary)	Overhead (%Salary)	1998 Loaded Annual Salary	1998 Loaded Hourly Rate
	Engineer (VI-VIII)	$104,971	10/17	$61,748						
	Attorney (IV-VI)	$116,255	5/17	$34,193						
	Accountant (V-VI)	$82,030	2/17	$9,651						
Managerial	Composite			$105,592	1.087	$114,779	40.4%	17.0%	$180,662	$86.86
	Engineer (III-VIII)	$83,243	5/6	$69,369						
	Accountant (III-VI)	$65,780	1/6	$10,963						
Technical	Composite			$80,332	1.055	$84,750	40.8%	17.0%	$133,736	$64.30
Clerical	Secretarial (I-V)	$31,502	1/1	$31,502						
	Composite			$31,502	1.063	$33,487	42.2%	17.0%	$53,311	$25.63

[a] Composite Salaries are determined by multiplying average salaries by the weighting factor and summing across occupations.

Sources: U.S. Department of Labor, Bureau of Labor Statistics (1996). *Occupational Compensation Survey, National Summary, 1996.*
U.S. Department of Labor, Bureau of Labor Statistics (1997). *Employer Costs for Employee Compensation — March 1997.*
U.S. Department of Labor, Bureau of Labor Statistics (1997). USDL News Release: 97-371, October 21. Table 11.
U.S. Department of Labor, Bureau of Labor Statistics (1998). *Employment Cost Index — March 1998.*
U.S. Department of Labor, Bureau of Labor Statistics (1998). USDL Bulletin 2497, March 1998, Tables A-1, D-1, and D-3.
U.S. Department of Labor, Bureau of Labor Statistics (1998). USDL News Release: 98-170. April 30. Table 6.

Accountants (levels V-VI), and Attorneys (levels IV-VI).[60] The technical level wage is a composite of the wage rates of Engineers (levels III-VIII) and Accountants (levels (III-VI).[61] The clerical wage rate is an average of all the clerical wage levels provided by BLS (i.e., levels I-V). The weighting factors used to develop the managerial and technical wage rates are based on information provided by the chemical industry and chemical industry trade associations on the typical fraction of total reporting effort that is accounted for by each specific BLS occupation category.[62]

The 1996 composite annual salary estimates were adjusted to first-quarter 1998 dollars using the Employment Cost Index (ECI) for white-collar occupations in private industries (US DL, 1998). The 1998 adjusted, composite salary for the managerial, technical, and clerical labor categories was then multiplied by benefits and overhead factors to estimate a 1998 loaded, annual salary. Detailed benefits data for white-collar occupations in private, goods-producing industries were used to account for the additional cost of benefits for managerial, technical, and clerical labor (USDL, 1998). The overhead factor of 17 percent is based on information provided by the chemical industry and chemical industry trade associations. The loaded annual salary was then divided by 2,080 hours (i.e., the average annual number of hours for a full-time employee) to derive the loaded, hourly wage rates used in this analysis for each labor category. The hourly wage rates are $86.86 for managerial personnel, $64.30 for technical personnel, and $25.63 for clerical personnel, all in 1998 dollars.

The remainder of this section discusses the costs associated with each specific industry task. Activities are organized into two categories: per facility costs and per report costs. As noted previously, these costs are summarized in Table C-2.

Per Facility Costs

Compliance determination

Under the modified reporting requirements, a facility must report under section 313 if it: (a) is within SIC codes covered by the TRI program; (b) has 10 or more employees or the equivalent of 10 full-time employees; and (c) manufactures, processes, or uses any of the PBT chemicals or lead and lead compounds above the proposed threshold quantities established for each chemical. All facilities in TRI covered industry groups must determine if they meet these criteria. It is assumed that facilities will not incur any incremental costs to make determinations regarding the first two criteria. The third determination, however, would require the management

[60]Managerial labor is assumed to be composed of operational labor, including engineers or chemists at the plant manager, facility research manager, or higher levels, legal managers, and financial managers.

[61]Technical labor is assumed to be composed of operational labor, including senior engineers or chemists equivalent to head process or project engineer, and financial labor, such as accountants. It is assumed that operational labor is used at a five-to-one ratio with financial labor.

[62]The current methodology does not include chemists in estimating the composite wage rates because updated information on wage levels for chemists was not available from BLS. The Engineer salary information is expected to be similar to Chemist salary information. In addition, BLS data for Level VI attorneys in goods-producing industries were not available, so wages for all private industry level VI attorneys were used instead.

and technical staff to determine the types of PBT chemicals and lead and lead compounds used at the facility, and whether they are manufactured, processed, or otherwise used above threshold levels.

The estimated number of facilities performing a compliance determination in the first year and in subsequent years in each of the SIC codes and/or industry groups is presented in Table C-4. For all industry groups, the number of facilities performing compliance determinations corresponds to the estimated number of facilities in each industry group with greater than or equal to 10 FTEs. The total number of facilities for each industry group was taken from information collected by the US Department of Commerce (USDOC, 1995) and from the RIA for the addition of certain industry groups to EPCRA section 313 (USEPA, 1997).

TABLE C-4
NUMBER OF FACILITIES CONDUCTING COMPLIANCE DETERMINATIONS
ALL OPTIONS

SIC Code	First and Subsequent Years
10—Metal Mining (except 1011, 1081, 1094)	268
12—Coal Mining (except 1241)	1,749
4911/4931/4939—Electric Services (Coal and Oil Facilities Only)	977
4953—RCRA Subtitle C TSDF's Only	162
5169—Chemical Wholesalers	2,801
5171—Bulk Petroleum	3,842
7389—Solvent Recovery Only	191
20-39—Manufacturing Facilities	180,507
TOTAL	190,497

To make the compliance determination, a facility must first review whether it manufactures, processes, or otherwise uses any of the PBT chemicals or lead in any quantity. If it does, then it must make a threshold determination to ascertain whether it manufactures, processes, or uses more than a threshold amount of the chemical or chemicals it has identified depending on the chemical specific threshold.

The first compliance determination activity involves checking the list of PBT chemicals and lead and lead compounds, therefore, the level of effort is related to the number of chemicals on the list. This step should be completed within a relatively short period of time. The second activity involves a more detailed set of calculations, and will typically involve a more substantial effort. Therefore, the time spent making threshold determinations is expected to comprise the majority of the time spent making a compliance determination.

In the Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 (hereafter known as the industry expansion EA), it was estimated that compliance determination would require one hour of managerial time and three hours of technical time to complete the compliance determination in subsequent years (USEPA, 1997). In the industry expansion EA, it was also assumed that facilities would require four times as many labor hours to complete a compliance determination in the first year compared to subsequent years (USEPA, 1997). Applying this four-fold factor yields estimates of four hours of managerial time and twelve hours of technical time per facility to make the compliance determination in the first year.

In both first and subsequent years, it is unclear whether making a compliance determination for the PBT chemicals and lead and lead compounds would be harder than, easier than, or equally as difficult as making the determination for the current list of over 600 chemicals and chemical compounds. Compliance determination might be more complicated in situations where the PBT chemical or lead is a byproduct or an impurity of a facility's main production processes, or is produced inadvertently outside a facility's main production processes. By contrast, for very low thresholds it may be easy for facilities to ascertain that they manufacture, process or use the chemical in at least some quantity. To generate an extremely precise burden estimate for compliance determination, the particular circumstances at each facility using PBT chemicals or lead would have to be known. Such a detailed understanding of per facility chemical usage was not possible for this analysis. Therefore, it is assumed that the average time needed by a facility for compliance determination will be proportional to the number of reports submitted for the PBT chemicals and lead and lead compounds in the first year and in all subsequent years. The total estimated number of additional reports under the preferred options (Option 2) of the two proposed rules, as the other three options is shown in Table C-1. The ratio of new reports expected under the proposed rules to total reports before either proposal under current reporting requirements is used as a weighting factor to adjust the unit cost estimate for compliance determination. The adjusted unit cost estimates for each of the options in first and subsequent years is presented in Table C-5.

TABLE C-5
ADJUSTED UNIT COSTS FOR COMPLIANCE DETERMINATION BY OPTION

	Expected Number of Lead and PBT Reports	Total Number of Reports[63]	Weighting Factor	Adjusted Unit Cost for Compliance Determination
FIRST YEAR				
Option 1	39,952	117,889	0.34	$380.47
Option 2 (Preferred)	32,372	117,889	0.27	$302.14
Option 3	26,091	117,889	0.22	$246.19
Option 4	20,234	117,889	0.17	$190.24
SUBSEQUENT YEAR				
Option 1	39,952	117,889	0.34	$95.12
Option 2 (Preferred)	32,372	117,889	0.27	$75.54
Option 3	26,091	117,889	0.22	$61.55
Option 4	20,234	117,889	0.17	$47.56

To calculate the incremental cost of compliance determination for the modified reporting requirements by industry group, the adjusted unit compliance cost is multiplied by the number of facilities in the industry group with more than 10 FTEs.

Rule familiarization

If a facility will be reporting under the section 313 requirements for the first time due to the either of the proposed rules, facility staff must review and comprehend the reporting requirements. At a minimum, this effort will involve reading the instructions to the Toxic Chemical Release Inventory Reporting Form R, however, it may also involve consulting EPA guidance documents, attending a training course, and/or calling the EPCRA technical hotline. The cost associated with rule familiarization occurs only in the first year that a facility becomes subject to reporting. In subsequent years, staff are assumed to be familiar with the requirements that apply to their facility. Thus, the facility would no longer bear this cost. Similarly, facilities

[63] In 1996, an estimated 71,735 reports were submitted to TRI. In addition, an estimated 46,154 reports will be submitted by industries affected by the TRI Industry Expansion Rule. As a result, the total number of reports is estimated to be 117,889.

reporting on one or more PBT chemicals and/or lead and lead compounds that already report on one or more existing TRI chemicals will not incur a rule familiarization cost.

It is estimated that facilities reporting under section 313 for the first time will need to make a one-time expenditure of 34.5 hours for rule familiarization. This burden estimate is comprised of 12 hours of management time and 22.5 hours of technical time (USEPA, 1997). Due to the recent TRI industry expansion, all of the facilities expected to report in the non-manufacturing SIC Codes will already be reporting to TRI. Therefore, first time filers are limited to facilities in the manufacturing industry group (SIC Codes 20-93). To generate an estimate of first time filers it is assumed that the distribution of reports per facility will not change after either of the proposed rules are promulgated. It is further assumed that if a facility files a single report, and it is for a PBT chemical or lead, then the facility must be new to the TRI system. Therefore, the unique number of facilities submitting reports for PBT chemicals or lead, calculated as described above, is multiplied by the percentage of reporters that filed only one report in 1996 (38.3%). The cost of rule familiarization is then calculated by applying the unit cost as shown in Table C-2 to the number of first time filers presented in Table C-6.

TABLE C-6
NUMBER OF UNIQUE FACILITIES AND FIRST TIME FILERS

	Unique Number of Manufacturing Facilities	Percent of Single Filers in 1996	Number of First Time Filers
FIRST YEAR			
Option 1	19,370	38.3	7,419
Option 2 (preferred)	15,425	38.3	5,908
Option 3	11,615	38.3	4,449
Option 4	8,239	38.3	3,156

Supplier notification

Under the current section 313 reporting requirements, suppliers of mixtures or trade name products containing listed chemicals above *de minimis* levels are required to notify their customers of the contents of their products on an annual basis. Supplier notification provides recipient facilities with information on the toxic chemical composition of the products they use and on the reporting requirements that may accompany the use of such chemicals. This information is then used in making threshold determinations and release calculations. The notification can be provided as a letter that identifies the chemical by name and CAS number and indicates its percentage by weight in the formulation. The notification can also be provided on the Material Safety Data Sheet (MSDS) for the product.

The EPCRA supplier notification requirements are not altered by either of the two proposals. Thus, the only facilities expected to incur additional supplier notification costs are those supplying mixtures or trade name products containing the PBT chemicals that 1) are not currently listed on TRI, 2) have a commercial use, and 3) are present above *de minimis* concentrations in the mixture or trade name product. As mentioned previously, lead and lead compounds do not meet these criteria. The PBT chemicals meeting this description include: tetrabromobisphenol A, vanadium compounds, and pentachlorobenzene. Based on information in the chemical specific appendices of the PBT EA (Appendices B - M), the number of facilities supplying mixtures or trade name products possibly containing each of these chemicals was estimated and is listed in Table C-7.

TABLE C-7
NUMBER OF FACILITIES EXPECTED TO PROVIDE SUPPLIER NOTIFICATION UNDER THE MODIFIED REPORTING REQUIREMENTS

Chemical	Number of Facilities Providing Supplier Notification
Tetrabromobisphenol A	59
Vanadium Compounds	14
Pentachlorobenzene	4
Total	77

The burden associated with performing supplier notification is estimated to be 24 hours per facility (USEPA, 1993). Of this, 7 hours are technical hours, and 17 hours are clerical hours. To estimate the total cost of supplier notification, the unit cost associated with supplier notification (presented in Table C-2) is applied to the total number of facilities listed in Table C-7 above. The cost associated with supplier notification will not vary across regulatory options since the requirement is not dependent on the reporting threshold.

Per Report Costs

Form R completion

Given the persistent, bioaccumulative, and toxic nature of the PBT chemicals and lead and lead compounds, facilities will not be able to take advantage of the alternate manufacture, process, or otherwise use threshold of one million pounds under either of the proposed rules. All facilities filing reports on PBT chemicals or lead with lower reporting thresholds must use the Form R.

Facilities that determine they must report on a PBT chemical or lead and lead compounds under the section 313 reporting requirements will incur costs to retrieve, process, review, and transcribe the information necessary to complete each report. Most of the time spent on form completion is used to calculate releases, transfers, and other waste management information; relatively little time is required to copy information to the form. The facility must complete one Form R for each chemical on which it reports. This effort will require more time in the first year than in subsequent years. In subsequent years, facilities will need to verify and update data, review previous calculations, and modify the information reported on the previous year's Form R, rather than estimate or retrieve data for the first time.

The estimated time for report completion equals 47 hours (14.3 hours of managerial, 30.8 hours of technical, and 2 hours of clerical time) (USEPA, 1997). This estimate represents a "subsequent-year" cost, because facilities already have experience preparing the form.

Following the methodology employed in the industry expansion EA, in order to estimate the report completion time for the first year, the subsequent-year cost was multiplied by the ratio of first-year cost to subsequent-year cost (USEPA, 1997). The time required to complete a report in the first year is estimated to be 147 percent of the time required in subsequent years. Applying this factor to the report completion estimate above, the time estimate required for reporting in the first year is 69.1 hours per report. Assuming the same labor mix indicated in the industry expansion EA, the 69.1 hours is assumed to be composed of 20.9 hours of management time, 45.2 hours of technical time, and 2.9 hours of clerical time.

The estimated number of reports to be filed by each industry is indicated in Table C-2 for each option. The total cost associated with Form R completion is calculated by multiplying the unit cost indicated in Table C-2 by the number of expected reports under each option.

Mailing and recordkeeping

After a facility has completed the form, it incurs additional labor costs for recordkeeping associated with filing a Form R. Recordkeeping allows a facility to use the information in making calculations in subsequent years, and as documentation in the event it receives a compliance audit. Facilities must maintain records such as estimation methodology and calculations, engineering reports, inventory, incident and operating logs, and any other supporting materials needed to provide the information required on the Form R.

Mailing and recordkeeping require five hours per Form R (four hours of technical and one hour of clerical time)(USEPA, 1997). Recordkeeping and mailing costs are not expected to vary between the first and subsequent years. Therefore, the five hours per Form R is assumed for both first and subsequent years. The estimated number of reports requiring recordkeeping and mailing is identical to the number of Form Rs expected to be filed as presented in Table C-2. Appendix A of this report and Appendices B through M of the PBT EIA describe how the number of reports was estimated for each industry group.

C.1.3 TOTAL INDUSTRY COSTS

The total industry costs includes the costs of rule familiarization, compliance determination, supplier notification, Form R completion, recordkeeping, and mailing. To compute the industry-wide cost of each compliance activity, the unit cost for each task is multiplied by the relevant number of facilities and/or reports associated with that task. Tables C-8a and C-8b present the total cost of the two proposals in the first and subsequent years for the affected industry groups under Option 1. Tables C-9a and C-9b present the total cost of the of the two proposals in the first and subsequent years under the preferred options: Option 2. Tables C-10a and C-10b present the total cost of the two proposals in the first and subsequent years under Option 3. Finally, Tables C-11a and C-11b present the total cost of the two proposals in the first and subsequent years under Option 4.

TABLE C-8a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 1 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$102	$288	$17	$0	$406
12—Coal Mining (except 1241)	$0	$663	$3,079	$182	$0	$3,924
4911—Electric Services (Coal and Oil Facilities Only)	$0	$195	$11,300	$666	$0	$12,161
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$163	$6,192	$365	$0	$6,720
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$13	$662	$39	$0	$713
4953—RCRA Subtitle C TSDF's Only	$0	$61	$1,688	$100	$0	$1,849
5169—Chemical Wholesalers	$0	$1,062	$101	$6	$0	$1,169
5171—Bulk Petroleum	$0	$1,457	$24,973	$1,473	$0	$27,903
7389—Solvent Recovery Only	$0	$72	$681	$40	$0	$794
20-39—Manufacturing Industries	$18,466	$68,455	$142,649	$8,412	$68	$238,050
TOTAL	$18,466	$72,244	$191,612	$11,300	$68	$293,689

TABLE C-8b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 1 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$25	$196	$17	$0	$239
12—Coal Mining (except 1241)	$0	$166	$2,102	$182	$0	$2,449
4911—Electric Services (Coal and Oil Facilities Only)	$0	$49	$7,713	$666	$0	$8,428
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$41	$4,226	$365	$0	$4,632
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$3	$452	$39	$0	$494
4953—RCRA Subtitle C TSDF's Only	$0	$15	$1,152	$100	$0	$1,267
5169—Chemical Wholesalers	$0	$266	$69	$6	$0	$340
5171—Bulk Petroleum	$0	$364	$17,047	$1,473	$0	$18,884
7389—Solvent Recovery Only	$0	$18	$465	$40	$0	$523
20-39—Manufacturing Industries	$0	$17,114	$97,373	$8,412	$68	$122,967
TOTAL	$0	$18,061	$130,795	$11,300	$68	$160,223

TABLE C-9a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 2 — PREFERRED OPTION — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$82	$288	$17	$0	$387
12—Coal Mining (except 1241)	$0	$537	$3,079	$182	$0	$3,798
4911—Electric Services (Coal and Oil Facilities Only)	$0	$158	$11,208	$661	$0	$12,027
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$132	$6,120	$361	$0	$6,613
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$10	$652	$38	$0	$701
4953—RCRA Subtitle C TSDF's Only	$0	$50	$1,659	$98	$0	$1,807
5169—Chemical Wholesalers	$0	$861	$101	$6	$0	$967
5171—Bulk Petroleum	$0	$1,181	$17,880	$1,054	$0	$20,115
7389—Solvent Recovery Only	$0	$59	$671	$40	$0	$770
20-39—Manufacturing Industries	$14,705	$55,467	$113,600	$6,699	$68	$190,539
TOTAL	$14,705	$58,537	$155,258	$9,156	$68	$237,724

TABLE C-9b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 2 — PREFERRED OPTION — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$21	$196	$17	$0	$234
12—Coal Mining (except 1241)	$0	$134	$2,102	$182	$0	$2,418
4911—Electric Services (Coal and Oil Facilities Only)	$0	$39	$7,651	$661	$0	$8,351
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$33	$4,177	$361	$0	$4,571
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$3	$445	$38	$0	$486
4953—RCRA Subtitle C TSDF's Only	$0	$12	$1,133	$98	$0	$1,243
5169—Chemical Wholesalers	$0	$215	$69	$6	$0	$290
5171—Bulk Petroleum	$0	$295	$12,205	$1,054	$0	$13,554
7389—Solvent Recovery Only	$0	$15	$458	$40	$0	$513
20-39—Manufacturing Industries	$0	$13,867	$77,543	$6,699	$68	$98,177
TOTAL	$0	$14,634	$105,979	$9,156	$68	$129,838

TABLE C-10a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 3 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$66	$288	$17	$0	$371
12—Coal Mining (except 1241)	$0	$433	$3,079	$182	$0	$3,694
4911—Electric Services (Coal and Oil Facilities Only)	$0	$127	$11,060	$652	$0	$11,839
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$106	$6,005	$354	$0	$6,465
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$8	$633	$37	$0	$679
4953—RCRA Subtitle C TSDF's Only	$0	$40	$1,611	$95	$0	$1,747
5169—Chemical Wholesalers	$0	$694	$101	$6	$0	$800
5171—Bulk Petroleum	$0	$952	$16,158	$953	$0	$18,062
7389—Solvent Recovery Only	$0	$47	$662	$39	$0	$748
20-39—Manufacturing Industries	$11,073	$44,705	$85,538	$5,044	$68	$146,428
TOTAL	$11,073	$47,179	$125,134	$7,379	$68	$190,834

TABLE C-10b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 3 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$17	$196	$17	$0	$230
12—Coal Mining (except 1241)	$0	$108	$2,102	$182	$0	$2,392
4911—Electric Services (Coal and Oil Facilities Only)	$0	$32	$7,549	$652	$0	$8,233
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$27	$4,099	$354	$0	$4,480
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$2	$432	$37	$0	$472
4953—RCRA Subtitle C TSDF's Only	$0	$10	$1,100	$95	$0	$1,205
5169—Chemical Wholesalers	$0	$173	$69	$6	$0	$248
5171—Bulk Petroleum	$0	$238	$11,029	$953	$0	$12,220
7389—Solvent Recovery Only	$0	$12	$452	$39	$0	$503
20-39—Manufacturing Industries	$0	$11,176	$58,388	$5,044	$68	$74,677
TOTAL	$0	$11,795	$85,417	$7,379	$68	$104,659

TABLE C-11a
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 4 — FIRST YEAR
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$51	$288	$17	$0	$356
12—Coal Mining (except 1241)	$0	$336	$3,079	$182	$0	$3,597
4911—Electric Services (Coal and Oil Facilities Only)	$0	$99	$10,873	$641	$0	$11,613
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$83	$5,870	$346	$0	$6,299
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$6	$614	$36	$0	$656
4953—RCRA Subtitle C TSDF's Only	$0	$31	$1,477	$87	$0	$1,595
5169—Chemical Wholesalers	$0	$538	$101	$6	$0	$645
5171—Bulk Petroleum	$0	$738	$13,443	$793	$0	$14,974
7389—Solvent Recovery Only	$0	$37	$623	$37	$0	$697
20-39—Manufacturing Industries	$7,854	$34,670	$60,675	$3,578	$68	$106,845
TOTAL	$7,854	$36,588	$97,043	$5,723	$68	$147,277

TABLE C-11b
DISTRIBUTION OF ESTIMATED COSTS BY COMPLIANCE ACTIVITY
LEAD AND PBT PROPOSALS
OPTION 4 — SUBSEQUENT YEARS
(1998 Dollars)

SIC Code	Rule Familiarization ($ thousands)	Compliance Determination ($ thousands)	Form R Completion ($ thousands)	Recordkeeping/ Mailing ($ thousands)	Supplier Notification ($ thousands)	Total ($ thousands)
10—Metal Mining (except 1011, 1081, 1094)	$0	$13	$196	$17	$0	$226
12—Coal Mining (except 1241)	$0	$84	$2,102	$182	$0	$2,367
4911—Electric Services (Coal and Oil Facilities Only)	$0	$25	$7,422	$641	$0	$8,088
4931—Electric & Other Services (Coal and Oil Facilities Only)	$0	$21	$4,007	$346	$0	$4,374
4939—Combination Utilities (Coal and Oil Facilities Only)	$0	$2	$419	$36	$0	$457
4953—RCRA Subtitle C TSDF's Only	$0	$8	$1,008	$87	$0	$1,103
5169—Chemical Wholesalers	$0	$134	$69	$6	$0	$209
5171—Bulk Petroleum	$0	$184	$9,176	$793	$0	$10,154
7389—Solvent Recovery Only	$0	$9	$426	$37	$0	$472
20-39—Manufacturing Industries	$0	$8,667	$41,417	$3,578	$68	$53,730
TOTAL	$0	$9,147	$66,242	$5,723	$68	$81,180

C.1.4 COSTS FOR PUBLICLY-OWNED FACILITIES

Municipal electric utilities in SIC code 4911 are the only publicly-owned facilities expected to be affected by the proposed lead and PBT rules. Table C-12 presents the estimated number of affected municipal electric utilities and the estimated number of reports from these facilities. Table C-13 presents the cost to these facilities for the first year and for subsequent years. These facilities, reports, and costs are included in the electric services (SIC codes 4911, 4931, and 4939) estimates in the other summary tables in this chapter.

TABLE C-12
REPORTING ESTIMATES FOR PUBLICLY-OWNED FACILITIES
LEAD AND PBT PROPOSALS

Option	Facilities Affected	Total Reports
Option 1	48	176
Option 2 (Preferred)	48	173
Option 3	48	168
Option 4	46	161

TABLE C-13
ESTIMATED COSTS FOR PUBLICLY-OWNED FACILITIES
LEAD AND PBT PROPOSALS
(Thousands of 1998 dollars)

Option	First Year	Subsequent Years
Option 1	$912	$631
Option 2 (Preferred)	$894	$619
Option 3	$865	$601
Option 4	$827	$575

C.1.5 TRANSFER PAYMENTS AND NON-MONETIZED COSTS

There are various state and federal requirements that are linked to the EPCRA section 313 reporting requirements. The associated requirements include state taxes and fees, state pollution prevention planning requirements, and special requirements for certain National Pollutant Discharge Elimination System (NPDES) storm water permits. These requirements are discussed in Appendix N (Associated Requirements) of the PBT EA. The costs calculated in this chapter include only those activities that are required by the two proposed rules. Although the fees, taxes, and pollution prevention requirements are linked to EPCRA section 313 reporting, they are not required by this rulemaking.

C.2 EPA COSTS

This section examines costs EPA would incur due to the proposed lead and PBT rules. By adding certain PBT chemicals to the list of reportable TRI chemicals and by lowering the thresholds for certain PBT chemicals and lead, EPA will incur costs for data processing, outreach and training, information dissemination, policy and petitions, and compliance and enforcement. These activities require additional EPA personnel, as well as extramural funds (for example, for contractors to perform data processing).

One way to characterize EPA's resource requirements is in terms of the number of data elements that must be processed. A data element is a single unit of information reported on Form R, such as the facility address or the number of pounds of the chemical released to air, that is entered into the TRI Information Management System. There are an average of 103 data elements entered into the system for each Form R. EPA is estimated to require 2.61 employees (also known as full time equivalents, or FTEs) and $551,600 in extramural funds for each additional million data elements that are added.[64] Assuming that half of the EPA employees are at the general pay scale grade 12 (i.e., GS-12, at a salary of $47,066) and half are at grade 13 (i.e., GS-13, at a salary of $55,969), and using a loading factor of 1.6 to account for employee benefits and other cost factors, yields an estimated annual cost of $82,428 per EPA employee.

Based on the number of reports predicted for the preferred option, and assuming that these reports will also contain an average of 103 data elements each, this yields an estimate of 3.3 million data elements. This translates into an estimate of $2.6 million per year for EPA costs in subsequent years. These results are summarized in Table C-14. The additional first-year costs to be incurred by EPA for outreach, training, and guidance are roughly estimated at $800,000. These costs are expected to be incurred in the first year only and are in addition to the costs presented in Table C-14.

[64]See Appendix K of the *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting (*April, 1997) for details of EPA's employee and cost model for TRI.

TABLE C-14
SUMMARY OF INCREMENTAL EPA COSTS
PREFERRED OPTION
LEAD AND PBT PROPOSALS
(Thousands of 1998 dollars)

DESCRIPTION	CUMULATIVE REPORTING REQUIREMENTS
# Data Elements	3.3 million
FTEs	8.7
Cost of FTEs	$717
Extramural Cost	$1,839
Total EPA Costs	**$2,556**

C.3 TOTAL COSTS

The estimated total cumulative cost to industry and EPA is $241 million in the first year and $133 million in subsequent years. Table C-15 summarizes the total cumulative costs to industry and EPA of the modified reporting requirements.

TABLE C-15
SUMMARY OF TOTAL COSTS: LEAD AND PBT PROPOSALS
(Millions of 1998 dollars)

DESCRIPTION	First Year	Subsequent Years
Industry Costs	$238	$130
EPA Costs	$3.36	$2.56
TOTAL COSTS	$241	$133

C.4 COST IMPLICATIONS OF THE OVERLAP IN AFFECTED FACILITIES BETWEEN THE PROPOSED LEAD RULE AND THE PROPOSED PBT RULE

As mentioned in Chapter 3, when the proposed lead rule is analyzed incrementally from current reporting, some of the facilities counted as "affected" by the proposed lead rule may also be "affected" by the PBT proposal. See Appendix B for a derivation of the number of overlapping facilities. Because the PBT rule is not yet final, costs associated with overlapping facilities are included in the total costs for the lead rule as well as in the total costs for the PBT rule.

The total cost associated with each of the proposed rules is estimated by multiplying 1) per report costs by the number of additional reports, and 2) per facility costs by the number of affected facilities. The number of reports is mutually exclusive between the two proposals because reports are chemical-specific (i.e., a Form R is filed each chemical). Therefore, no double-counting of report-specific costs can occur. Per facility costs associated with overlapping facilities include rule familiarization costs in the first year only (for new filers) and compliance determination costs (for new filers and current TRI reporters). Because compliance determination is linked to the list of regulated chemicals, all facilities with 10 or more employees in industry groups subject to EPCRA section 313 reporting requirements will have to complete this task separately for each proposed rule and compliance determination costs will not be double counted. Rule familiarization is therefore the only activity for which double-counting of costs can occur.

At the preferred options presented in both proposals, the number of first time filers potentially affected by both proposals equals 1,773 facilities. The associated rule familiarization costs equal $4.4 million in the first year only. Therefore, upon finalization the aggregate cost of the two proposals may be less than the sum of the industry costs as presented in the respective economic analyses due to this potential double-counting of reporting costs. Specifically, at the preferred options for both proposals rule familiarization costs were estimated at $6.5 million for PBT chemicals and $12.6 million for lead in the respective economic analyses. Summing these rule familiarization costs yields a total rule familiarization cost of $19.1 million. However, as shown in Table C-9a above, when the total costs of the two proposals is calculated, rule familiarization costs equal $14.7 million. The difference of $4.4 million represents the extent to which rule familiarization costs are double counted when the two proposed rules are analyzed separately from the current reporting baseline.

LITERATURE CITED

U.S. Department of Commerce, Bureau of the Census. 1995 County Business Patterns, Washington, D.C.: Government Printing Office, 1995.

U.S. Department of Labor, Bureau of Labor Statistics. Employer Costs for Employee Compensation — March 1997. U.S. Department of Labor, Washington D.C., October 21. USDL News Release: 97-371, Table 11, 1997

U.S. Department of Labor, Bureau of Labor Statistics (1988). Employment Cost Index—March 1998. U.S. Department of Labor, Washington D.C., April 30. USDL News Release 98-170, Table 6, 1998.

U.S. Department of Labor, Bureau of Labor Statistics. Occupational Compensation Survey, National Summary 1996 (1998). U.S. Department of Labor, Washington, D.C., March. Bulletin 2497, Tables A-1, D-1 and D-3, 1998.

U.S. EPA. Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting. April, 1997.

APPENDIX D
POTENTIAL IMPACTS: LEAD AND PBT PROPOSALS[65]

This chapter addresses the potential impacts on small entities, as well as on certain demographic groups, of the proposed lead and PBT rules. Section D.1 provides a description of the potential impacts on small entities of the proposed lead and PBT rules. Section D.2 discusses the effect on small entity impacts of considering the proposed lead and PBT rules together versus separately.

D.1 IMPACTS ON SMALL ENTITIES

Section D.1.1 provides the definition of a small entity for each industry group covered under the proposed lead and PBT rules. Section D.1.2 describes the general methodology used to determine if proposals may result in significant economic impacts on a substantial number of small entities. Section D.1.3 describes the revenue data used in this analysis. Section D.1.4 describes the specific approach used to analyze the impacts on each industry group and presents the results for each of these analyses. Section D.1.5 summarizes the results for all affected small entities.

D.1.1 DEFINITIONS OF SMALL ENTITIES

For this analysis, EPA is using the Small Business Administration's (SBA's) definition of a small business for each industry.[66] SBA's small business size standards vary by industry. In establishing size standards, SBA considers a number of economic and market characteristics that may allow a business concern to exercise dominance in an industry. Size standards are based on criteria, such as annual receipts or number of employees, that represent a measure of these characteristics. These standards represent the largest size that a for-profit enterprise (together with its affiliates) may be and qualify as a small business. For the industries included in this analysis, the definitions are as follows:

- Metal mining (SIC code 10) 500 employees
- Coal mining (SIC code 12) 500 employees
- Electric services (SIC code 4911) 4 million megawatt hours
- Electric and other services (SIC code 4931) $5.0 million in annual receipts

[65] EPA does not believe that it is required by statute or executive order to prepare the following analysis. The information presented on the potential for certain facilities to be affected by the proposed lead rule and the proposed PBT rule (January 5, 1999; 64 FR 688) is only intended for informational purposes. The proposed PBT rule and this proposed rule to lower thresholds for lead and lead compounds are two distinct proposed rules, and any changes made by EPA when finalizing one rule will not necessarily affect the other rule.

[66] SBA's most recent revisions to its "size standards" can be found in the January 31, 1996 Federal Register (61 FR 3175). Several minor corrections were published subsequent to the January notice. The SBA Internet site contains the corrected standards. The Internet address is: http://www.sbaonline.sba.gov/gopher/Financial-Assistance/Size-Standards.

•	Combination utilities (SIC code 4939)	$5.0 million in annual receipts
•	Refuse systems (SIC code 4953)	$6.0 million in annual receipts
•	Chemical and allied products (SIC code 5169)	100 employees
•	Petroleum bulk stations & terminals (SIC code 5171)	100 employees
•	Business services (SIC code 7389)	$5.0 million in annual receipts
•	Manufacturing (SIC codes 20 - 39)	500 employees

The SBA small business size standards are expansive, classifying most businesses as "small." For example, the default SBA size standard for manufacturing industries is 500 employees. According to information compiled by the Bureau of the Census, 325,395 of 330,310 firms have fewer than 500 employees (SBA, 1995). Therefore, at least 98.5 percent of firms would be classified as small businesses according to the SBA definition. In fact, this percentage is actually higher, since for certain SIC codes within manufacturing, the SBA size standard is 750, 1,000, or 1,500 employees.

"Small governmental jurisdictions" are defined as governments of cities, counties, towns, school districts, or special districts with a population of less than 50,000 people. This analysis applies this definition of a small governmental jurisdiction in evaluating the impacts on publicly-owned establishments affected by this rulemaking (i.e., municipally-owned electric utilities).

"Small organizations" are defined as any "not-for-profit enterprise which is independently owned and operated and is not dominant in its field." No small organizations are expected to report on any PBT chemicals or lead and lead compounds as a result of the proposed lead or PBT rules.

D.1.2 METHODOLOGY OVERVIEW

This analysis uses annual cost impact percentages to measure potential impacts on small entities. The cost impact percentage is defined as annual compliance costs as a percentage of annual revenues or sales. This approach is based on the premise that the cost impact percentage is an appropriate measure of a firm's ability to afford the costs attributable to a regulatory change. For purposes of determining small entity impacts, comparing annual compliance costs to annual revenues provides a reasonable indication of the magnitude of the regulatory burden relative to a commonly available and objective measure of a company's business volume. Where regulatory costs represent a very small fraction of a typical firm's revenue, the impacts of the regulation are likely to be minimal.

The cost impact percentages are calculated using both the first- and subsequent-year compliance costs. As explained in Chapter 4 and Appendix C, annual compliance costs are composed of facility- and report-specific costs. Facility-specific costs such as compliance determination and rule familiarization do not vary with the number of reports filed. Report-specific costs such as Form R completion and recordkeeping vary according to the number of reports a facility files.

The general methodology followed to estimate the impacts on small entities consists of following steps:

(1) Obtain company-level annual revenue data;

(2) Develop company-level annual compliance cost estimates, based on the number of facilities per company and the number of reports per facility;

(3) Estimate the company-level impact percentages, defined as annual compliance costs as a percentage of annual revenues, as a measure of regulatory burden;

(4) Estimate the number of small companies affected (i.e., the number of small companies with at least one reporting facility);

(5) Estimate the percentage and number of small companies with company-level annual impact percentages in each of three categories: (1) less than one percent; (2) between one and three percent; and (3) greater than or equal to three percent.

The resolution of the analysis varies somewhat by industry group depending on the level of aggregation of compliance costs for each industry. Not all affected industry groups were analyzed at the 4-digit SIC code level. Specifically, the impacts on SIC codes 10 and 12 are examined at the two-digit level. SIC codes 20-39 are examined as a composite for all manufacturing. SIC codes 5169 and 5171 are examined at the four-digit level. For coal- and oil-fired electric services (SIC codes 4911, 4931, and 4939), RCRA subtitle C facilities (SIC code 4953), and solvent recovery services (SIC code 7389), the analysis examines the impacts on only the specific portions of the industry groups subject to TRI reporting. In the following sections, the analysis and results for each industry group are described. In addition, there is a section describing the analysis of the impacts on publicly-owned entities.

D.1.3 GENERATION OF COMPANY REVENUE DATA

This section describes how employment and revenue data were developed for companies in affected industries. For most industry groups, this analysis does not predict which specific companies have facilities that are expected to report on lead and lead compounds. Rather, the general approach is to construct industry group profiles that represent potential reporting companies. These profiles are then used to estimate the employment and revenues of the parent companies of potentially affected facilities and to estimate the percentage of parent companies classified as large or small.

For SIC codes 20-39 it is assumed that manufacturing facilities expected to file for lead and lead ccmpounds, are similar to current reporters in terms of employment and revenues. Therefore, employment and revenue profiles are constructed for parent companies of current TRI reporters and are then used in this analysis to represent parent companies of facilities expected to report on lead and lead compounds. For all other SIC codes except 4911, 4953, and 7389, employment and revenue profiles were created using D&B data for every facility with more than 10 FTEs in the affected SIC codes, even though not all of the facilities are expected to report. It is assumed, however, that the facilities that do report have characteristics similar to the larger group. For 4911, 4953, and 7389, a more specific list of facilities based on other reporting

criteria was used to identify facilities likely to report. Employment and revenue profiles were then created using D&B data for these facilities.

Company employment and revenue data were obtained for commercial facilities in the industry groups affected by the proposed rule from *Dun and Bradstreet's Market Identifiers On-Line Data Base* and *Dun's Marketing Services*, both services of Dun and Bradstreet (D&B). For over 11 million business locations, D&B provides data such as:

- Number of employees
- Line of business
- Key financial indicators
- Parent/headquarters

as well as many other variables. Employment and revenue data for commercial facilities in the manufacturing SIC codes (20-39) and in SIC code 7389 were obtained from a March 1998 version of *Dun's Marketing Services* which was the latest version available through EPA's Mainframe computer at the time of this analysis. Dun and Bradstreet data for August of 1995 were obtained for SIC codes 10, 12, 4911, 4931, 4939, 4953, 5169, and 5171 as part of the TRI industry expansion economic analysis. For manufacturers and solvent recyclers, revenue figures were obtained in 1998 dollars. For the remaining SIC codes, all revenue figures were either obtained in 1995 dollars or converted to 1995 dollars using the implicit price deflator for the U.S. Gross Domestic Product.

EPA accesses *Dun's Marketing Services* through the FINDS system located on the Agency's IBM mainframe computer. The FINDS system contains selected D&B variables and contains no financial data other than revenue figures. The D&B data base uses the Standard Industrial Classification (SIC) code system to categorize business establishments based on the type of activity undertaken at that location. The employment and revenue data used in this analysis represent data for ultimate parent companies that own one or more establishments with a *primary* SIC code matching one of the SIC codes covered under the proposed rule.[67,68] As mentioned above, for SIC codes 20-39 it is assumed that manufacturing facilities expected to file for lead and lead compounds are similar to current reporters in terms of employment and revenues. Therefore, current TRI reporters were identified in D&B. Employment and revenue data was obtained for the ultimate parent companies linked to these facilities. For SIC codes 10, 12, 4931, 4939, 5169 and 5171, the analysis identified all establishments listed in D&B with a

[67] A facility with multiple SIC codes is subject to TRI if the largest share of its revenue is from a covered SIC code, or if the total value of revenues derived from covered SIC codes represents a majority of the facility's revenues. It is not possible to determine whether a facility would be subject to reporting based on the Dun & Bradstreet SIC code listing alone. Dun's contains a primary SIC code and up to five additional (secondary) SIC codes; each SIC code represents a minimum of 10 percent of the location's revenue. For this analysis, it was assumed that the primary SIC code represents the largest share of a facility's operations, and thus a facility with a primary SIC code covered by the proposed rule was assumed to be subject to TRI reporting.

[68] The ultimate parent is the uppermost parent or headquarters that encompasses all directly related branches, subsidiaries or parents of a specific business. For the purposes of this analysis, establishments in Dun's were assumed to correspond to facilities in TRI.

matching SIC code, based on the establishment's primary SIC code classification, and obtained employment and revenue information for the establishment's ultimate parent company.[69] For SIC codes 4953 and 7389, the analysis identified the potential reporters in D&B and obtained employment and revenue information for the establishment's ultimate parent company.

Using the employment and revenue profiles, parent companies in each industry group were classified as small or large (based on SBA definitions). Annual revenue quartiles were determined for each size class and industry group. Information on the average number of facilities per parent company was also collected for the industry group as a whole and for small and large companies within the industry group.

For most industry groups it was not possible to identify the specific facilities expected to report. In the case of coal- and oil-fired electric power generating facilities in SIC code 4911, information was available for a specific list of facilities expected to report. From the list of facilities expected to report, the analysis obtained the number of employees and annual revenue for the ultimate parent company associated with each individual establishment. For SIC code 4911, it was not necessary to construct revenue quartiles, rather small entity impacts were estimated for the parent companies of coal and oil-fired electric utilities affected by the proposed lead and PBT rules.

The analysis accounts for parent companies owning more than one affected facility to obtain a list of unique ultimate parent companies. Consistent with the SBA size standards, the ultimate parent data obtained include available data on employees and revenues of all subsidiaries, divisions and branches of that parent, including those not individually affected under the proposed rule. The estimated number of facilities per ultimate parent, however, represents the number of facilities owned by that parent company that are classified in the affected SIC code or industry group (not the total number of facilities per parent company).

The information outlined in this section on company size, company revenues, and numbers of reporting facilities per company are used in the following sections to estimate small entity impacts.

D.1.4 ESTIMATING SMALL COMPANY IMPACTS

To evaluate the potential burden of the two proposals, annual compliance costs are estimated at the company level to be consistent with the financial data generated from D&B and other sources. For purposes of evaluating the impacts on small entities, an "affected" facility is defined as a facility that will submit at least one report as a result of the proposed rules. Thus, an "affected" company under this analysis is defined as a company owning at least one "affected" facility. In the next section, the impacts to industry groups for which revenue quartiles were generated are estimated. Impacts to SIC code 4911 are estimated in the subsequent section.

[69] The employee and revenue data used for SIC code 12 (Coal mining) include all operations except those in SIC code 1241, while the facilities actually expected to report only includes facilities with coal preparation operations.

SIC codes 10, 12, 20-39, 4931, 4939, 4953, 5169, 5171, and 7389

The analysis of small entity impacts for these SIC codes uses (1) a range of reports per facility,[70] (2) the average number of facilities per company for small companies, and (3) the annual revenue for the 25th, 50th, and 75th percentage quartile for small companies. For SIC codes 10, 12, 20-39, 4931, 4939, 5169, and 5171, the revenue data and average number of locations per small company were estimated from the analysis of the Dun and Bradstreet data, as described in Section D.1.4. For SIC code 4953, the revenue and average number of facilities per parent company were obtained from D&B for a subset of facilities expected to report to TRI.[71] For SIC code 7389, the revenue and average number of facilities per parent company were estimated from 1998 D&B data obtained for 52 solvent recovery facilities identified in *EI Digest*.[72] Chapter 3 and Appendix A of this report as well as Appendices B through M of the PBT EA describe how the number of reports per industry group was estimated.

Parent company compliance cost estimates were developed by multiplying the unit cost of compliance by one report per facility and by the average number of facilities per parent company. Table D-1 presents the first-year and subsequent-year company-level cost impact percentages for the 25th, 50th, and 75th percent quartiles for small and large companies in SIC codes 10, 12, 20 - 39, 4931, 4939, 4953, 5169, 5171, and 7389 under the preferred option (Option 2).

Estimating the number of small companies affected

To estimate the number of small companies affected, EPA used the following approach:

Step 1: Estimate the total number of companies (all sizes) affected by dividing the estimated number of affected facilities in each industry by the average number of facilities per parent for the industry as a whole. The average number of facilities per parent for SIC codes 10, 12, 20-39, 4931, 4939, 4953, 5169, 5171, and 7389 was obtained from the analysis of the Dun and Bradstreet data base as described in Section D.1.4. They are presented in Table D-1.

---

[70] This analysis assumes that a facility, as defined under TRI, is equivalent to a location as defined by D&B. A "facility," subject to EPCRA section 313 reporting requirements, means all buildings, equipment, structures, and other stationary items which are located on a single site or on contiguous or adjacent sites, and which are owned or operated by the same person, that is classified under an SIC code covered by the regulations, has 10 or more employees or the equivalent, and manufactures, processes, or otherwise uses any of the listed toxic chemicals or chemical categories above the specific reporting thresholds. For some industries this may not correspond exactly to the definition of a location by D&B.

[71] The TRI Industry Expansion analysis identified 162 facilities in SIC code 4953 expected to report. Of the 162, 150 were matched to 76 unique ultimate parent companies. Of these 76 ultimate parents, the Duns data base included revenue data for 59 (six of which were small according to the SBA definitions), accounting for 127 facilities. Based on this data, the analysis estimated that the 162 facilities in the industry have 82 parent companies, of which 8 are small.

[72] As described in D.1.3, this group of facilities (and associated parent companies) is expected to be representative of facilities that may report as a result of the proposed lead and PBT rules.

Step 2: Divide the estimated number of companies (all sizes) into size categories (in this case, large and small as defined by SBA) using the distribution of large and small companies for each industry as indicated from the Dun and Bradstreet data described in Section D.1.4.

Table D- 2 presents the inputs and results of these calculations for each industry under the preferred option.

TABLE D-1
COMPANY-LEVEL COST IMPACT PERCENTAGES
LEAD AND PBT PROPOSALS--PREFERRED OPTIONS
FIRST YEAR RANGE OF POTENTIAL IMPACTS

SIC Code		Avg. # of Fac. / Company	Number of Reports per Facility		First Year Total Costs		25% Quartile Cost/Rev Ratio		Median Cost/Rev Ratio		75% Quartile Cost/Rev Ratio	
			Low	High	Low	High	Low	High	Low	High	Low	High
10	large	2.5	1	1	$14,420	$14,420	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	small	1.2	1	1	$6,581	$6,581	0.5%	0.5%	0.1%	0.1%	0.0%	0.0%
12	large	3.6	2	2	$38,884	$38,884	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	small	1.1	2	2	$11,773	$11,773	0.8%	0.8%	0.4%	0.4%	0.2%	0.2%
4931	large	3.1	1	8	$17,854	$128,777	0.1%	0.5%	0.0%	0.0%	0.0%	0.0%
	small	1.0	1	8	$5,722	$41,275	0.3%	2.3%	0.2%	1.3%	0.1%	1.0%
4939	large	1.8	1	8	$10,014	$72,230	0.1%	0.6%	0.0%	0.0%	0.0%	0.0%
	small	1.0	1	8	$5,722	$41,275	0.4%	2.8%	0.3%	2.2%	0.2%	1.5%
4953	large	2.3	1	7	$12,932	$81,802	0.0%	0.3%	0.0%	0.1%	0.0%	0.0%
	small	1.2	1	7	$6,695	$42,349	0.2%	1.3%	0.2%	1.2%	0.1%	0.9%
5169	large	3.7	1	2	$20,944	$39,532	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	small	1.6	1	2	$6,008	$11,341	0.3%	0.6%	0.2%	0.3%	0.1%	0.1%
5171	large	1.9	1	4	$11,101	$40,660	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%
	small	1.0	1	4	$5,894	$21,588	0.1%	0.5%	0.1%	0.3%	0.0%	0.2%
7389	large	1.2	1	4	$6,867	$25,151	0.1%	0.2%	0.0%	0.1%	0.0%	0.0%
	small	1.1	1	4	$6,295	$23,055	0.5%	1.9%	0.3%	1.0%	0.2%	0.6%
20-39	large	3.7	1	16	$24,449	$303,280	0.0%	0.2%	0.0%	0.1%	0.0%	0.0%
	small	1.1	1	16	$7,415	$91,978	0.2%	2.3%	0.1%	0.9%	0.0%	0.4%

TABLE D - 1 (cont'd)
COMPANY-LEVEL COST IMPACT PERCENTAGES
LEAD AND PBT PROPOSALS--PREFERRED OPTIONS
SUBSEQUENT YEAR RANGE OF POTENTIAL IMPACTS

SIC Code		Avg. # of Fac. / Company	Number of Reports per Facility		First Year Total Costs		25% Quartile Cost/Rev Ratio		Median Cost/Rev Ratio		75% Quartile Cost/Rev Ratio	
			Low	High	Low	High	Low	High	Low	High	Low	High
10	large	2.5	1	1	$9,368	$9,368	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	small	1.2	1	1	$4,275	$4,275	0.0%	0.3%	0.1%	0.1%	0.0%	0.0%
12	large	3.6	2	2	$26,187	$26,187	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	small	1.1	2	2	$7,929	$7,929	0.0%	0.5%	0.3%	0.3%	0.1%	0.1%
4931	large	3.1	1	8	$11,599	$89,275	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%
	small	1.0	1	8	$3,717	$28,614	0.0%	1.6%	0.1%	0.9%	0.1%	0.7%
4939	large	1.8	1	8	$6,506	$50,074	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%
	small	1.0	1	8	$3,717	$28,614	0.0%	1.9%	0.2%	1.5%	0.1%	1.1%
4953	large	2.3	1	7	$8,402	$56,629	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%
	small	1.2	1	7	$4,349	$29,317	0.0%	0.9%	0.1%	0.8%	0.1%	0.7%
5169	large	3.7	1	2	$13,606	$26,623	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	small	1.6	1	2	$3,903	$7,638	0.0%	0.4%	0.1%	0.2%	0.0%	0.1%
5171	large	1.9	1	4	$7,212	$27,912	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	small	1.0	1	4	$3,829	$14,819	0.0%	0.4%	0.1%	0.2%	0.0%	0.1%
7389	large	1.2	1	4	$4,461	$17,265	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%
	small	1.1	1	4	$4,089	$15,826	0.0%	1.3%	0.2%	0.7%	0.1%	0.4%
20-39	large	3.7	1	16	$13,622	$208,881	0.0%	0.2%	0.0%	0.1%	0.0%	0.0%
	small	1.1	1	16	$4,131	$63,349	0.0%	1.6%	0.0%	0.6%	0.0%	0.2%

TABLE D-2
ESTIMATED NUMBER OF AFFECTED SMALL ENTITIES
LEAD AND PBT PROPOSALS
PREFERRED OPTIONS

SIC Code	Estimated Number of Affected Facilities	Average Number of Facilities Per Parent	Estimated Number of Parent Entities	Estimated Percentage of Small Entities	Estimated Number of Small Entities
Industry					
10	60	1.9	31	60%	19
12	321	1.4	226	87%	197
4911	463	4.1	112	26%	29
4931	291	2.7	107	8%	9
4939	33	1.3	25	26%	6
4953	162	2.2	75	10%	8
5169	20	1.6	13	81%	10
5171	1,229	1.2	1,042	84%	875
7389	118	1.2	98	32%	31
20-39	15,425	1.9	7,992	68%	5,434
Municipal Utilities	48	1.3	38	47%	18
TOTAL	18,170	1.9	9,759	68%	6,636

Note: Due to rounding, calculations may not yield exact numbers.

Estimating small company impacts

The number of small companies with impacts of 1) less than one percent, 2) between one percent and three percent, or 3) greater than or equal to three percent is estimated using a distribution of reports per facility and a distribution of companies by revenue level.

As described in Appendix B, a distribution of the number of PBT and lead reports filed per facility was developed for each SIC code. This distribution was then used to derive the number of unique facilities filing each possible number of reports. In the small entity analysis, the distribution of unique facilities for each SIC code (i.e., percent of facilities filing 1 report, percent of facilities filing 2 reports, etc) was used. This distribution was applied to the estimated number of affected small and large facilities from that industry group to distribute small and large facilities across the full range of potential reporting. For SIC codes where the unique number of facilities was capped at the maximum, an even distribution of reporting across the full range of reports filed per facility was used.

Companies in each size class (large or small) were assumed to be evenly distributed between the first quartile (25%), middle quartile (50%), and third quartile (75%) of annual revenues for each industry group.[73] Assuming an even distribution of companies by revenue level implies that one-third of the companies are most like the 25th percent quartile company, one-third are most like the 50th percent, or median company, and one-third are most like the 75th percent quartile company. In contrast, a normal distribution would imply that more companies (i.e., greater than one-third) are most like the median company than like the 25th or 75th percent quartile company. Assuming an even distribution increases the estimated percentage (and number) of companies with lower revenues, and thus, with higher cost impacts.

Steps to estimate impacts

The magnitude of the impact on a small company when the two proposed rules are considered together depends on (1) the number of facilities that a small company has, (2) the number of additional reports each facility files, and (3) the overall revenues of the small company. The methodology used to estimate the impact of the proposed rule on small companies includes five steps. For demonstration purposes, a simulated industry group (SIC code XXXX) is presented in the following exhibits to illustrate each step.

Step One

For each industry group, the distribution of reports per facility was obtained as described in Appendix B. This distribution indicates the number of facilities that file one report, the number that file two reports, and so on. The number of reports that a facility files at a given threshold is related to the activities and characteristics of that facility. These characteristics may include the products manufactured at the facility, the processes undertaken, and the throughput of PBT chemicals and lead and lead compounds. Exhibit 1 shows the *number* of facilities in SIC code XXXX that file each possible number of reports.

EXHIBIT 1

SIC Code XXXX

	Number of Reports per Facility		
Total Facilities	1	2	3
200	140	40	20

Step Two

Next, the *percentage* of total affected facilities filing each possible number of reports is calculated (see Exhibit 2). The number of TRI reports that a given facility files is not necessarily closely related to the size of that facility's parent company. A facility that files a single report may be the only facility owned by a small company, or it may be one of many facilities owned by

[73] The development of these quartiles was described in Section D.1.3.

a larger company. Therefore, for this analysis, it was assumed that the facilities in an industry group that are owned by small companies have the same distribution of reports per facility as facilities owned by large companies. For example, if 70 percent of all facilities in an industry group file 1 report, then it is assumed that 70 percent of facilities owned by small companies file 1 report and 70 percent of facilities owned by large companies file 1 report.[74] An application of this assumption is shown in Exhibit 2. This table shows that, of facilities filing reports, 70 percent file one report, 20 percent file two reports, and 10 percent file three reports.

EXHIBIT 2

SIC Code XXXX				
Distribution by Size/# Reports		Number of Reports per Facility		
Company Size Class	Total Facilities	1	2	3
Small or Large	100%	(140/200) = 70%	(40/200) = 20%	(20/200)=10%

Step Three

Due to data limitations, it is not possible to predict the exact number of PBT chemical reports that individual facilities will file, to identify all affected facilities comprehensively, and to match all affected facilities to parent companies. Therefore, revenue quartiles were developed to characterize companies in each industry group. Revenue quartiles are developed so that company compliance costs (which will vary according to numbers of reports expected per facility and the average number of facilities per company) can be compared to an estimate of company revenues. This analysis assumes that one-third of the companies are most like the 25th percent quartile company, one-third are most like the 50th percent, or median company, and one-third are most like the 75th percent quartile company.

Next, the percentages of affected facilities in Exhibit 2 are divided evenly among three revenue quartiles (25%, 50%, 75%)(see Exhibit 3). This results in a conservative estimate of small entity impacts, since distributing facilities *evenly* across company revenue quartiles may result in an overestimate of impacts.[75]

---

[74] In fact, this assumption may result in an overestimate of the number of reports that may be filed by facilities that are owned by small companies. An SIC code-specific analysis of current (1996) TRI reporting showed that facilities owned by small companies tended to file fewer reports than facilities owned by large companies.

[75] Facilities owned by smaller companies may actually submit fewer reports than facilities owned by larger companies. For many PBT chemicals and lead, the number of reports a facility will file is related to fuel throughput. PBT chemicals and lead are present in fuel at varying concentrations. Consequently, as fuel throughput increases, so will the number of PBT and lead reports per facility at a given threshold. Throughput is typically related to production levels or other economic activity at a facility, thus facilities in a given SIC code with higher throughput (and more reports) would be expected to have higher revenues than facilities in the same SIC code with lower throughput (and fewer reports).

EXHIBIT 3

SIC Code XXXX

Distribution by Size/Revenue/# Reports		Number of Reports per Facility		
Company Size class	Revenue Category	1	2	3
Small or Large	25%	23.3% of facilities	6.7% of facilities	3.3% of facilities
	50%	23.3% of facilities	6.7% of facilities	3.3% of facilities
	75%	23.3% of facilities	6.7% of facilities	3.3% of facilities

Step Four

In order to assess *company* level impacts, cost impact percentages are calculated for each possible combination of company level revenue and number of reports filed per facility. Company level cost impact percentages are based on total annual compliance costs divided by annual revenues at the company level. The impact percentages are calculated as follows:

$$\textit{Company Impact Percentage} = \left[\frac{\textit{Cost per Facility} \times \textit{Avg \# of Facilities per Company}}{\textit{Company Revenue}}\right] + \left[\frac{\textit{Avg \# of Facilities per Company} \times \textit{\# of Reports per Facility} \times \textit{Cost Per Report}}{\textit{Company Revenue}}\right]$$

For example, if

cost per facility = $1,603, and
avg # of facilities per company = 2, and
so on, then:

$$0.5\% = \left[\frac{\$1{,}603 \times 2}{\$2{,}672{,}800}\right] + \left[\frac{2 \times 1 \times \$5{,}079}{\$2{,}672{,}800}\right]$$

Company cost impact percentages are presented in Exhibit 4.

EXHIBIT 4

SIC Code XXXX

Company Impact Percentages by Size/Revenue/ # Reports			Number of Reports per Facility		
Company Size class	Avg # of Fac/Co.	Revenue Category	1	2	3
Small	2	25%	0.5%	1.5%	4.0%
	2	50%	0.1%	0.5%	2.0%
	2	75%	0.0%	0.1%	0.5%
Large	4	25%	0.0%	0.0%	0.0%
	4	50%	0.0%	0.0%	0.0%
	4	75%	0.0%	0.0%	0.0%

To determine the percentage of companies with cost impact percentages in each category, each cost impact percentage shown in Exhibit 4 is then compared to each of three impact categories: (1) less than one percent of annual revenues; (2) between one and three percent of annual revenues; (3) greater then three percent of annual revenues. For example, Exhibit 4 indicates that small companies in SIC code XXXX own an average of 2 facilities. If each of the facilities files one report, then a company with revenues at the 25% quartile would have a cost impact percentage of 0.5% at the company level.

In this analysis, a constant relationship exists between numbers of facilities and numbers of companies within each size class and revenue quartile: the *percentage of facilities* filing each possible number of reports equals the *percentage of companies* owning facilities that file each possible number of reports.

As an example, assume that there are 80 facilities in SIC code YYYY that file additional reports on PBT chemicals and lead and lead compounds. Since the average number of facilities per small company in SIC code YYYY equals 2, the total number of small companies equals 40. If twenty percent of the facilities file one report and are owned by small companies with revenues in the 25% quartile then 16 facilities (80 x 0.20 = 16) filing one report each are owned by small companies with revenues in the 25% quartile. Given the average of 2 facilities per company in SIC code YYYY,8 small companies or twenty percent (8/40 = 0.20) of the small companies have revenues in the 25% quartile and own 2 facilities that each file one report. Therefore, twenty percent of facilities file one report and are owned by small companies with revenues in the 25% quartile and twenty percent of small companies have revenues in the 25% quartile and own 2 facilities that each file one report.

Referring back to Exhibit 3, 23.3% of the facilities file one report and are associated with small companies with revenues in the 25% quartile. As explained above, it is appropriate to assume the same percentage of small companies have revenues in the 25% quartile and own 2 facilities that file one report each. Thus, as shown in Exhibit 5, 23.3% of the small companies incur cost impact percentages of 0.5%, which is less than one percent of annual revenues. In Exhibit 5, this same comparison is performed for each of the possible combinations of company-level revenues and numbers of reports per facility.

EXHIBIT 5

SIC Code XXX

Percent of Small Companies with Impact Percentages *Less than 1%*

			Number of Reports per Facility		
Company Size Class	Revenue Category	**Total %**	1	2	3
Small	25%	**23.3+0+0=23.3%**	[0.5% is not greater than 1%] therefore **23.3%**	[1.5% is greater than 1%] therefore **0%**	[4.0% is greater than 1%] therefore **0%**
	50%	**23.3+6.7+0=30.0 %**	[0.1%is not greater than 1%] therefore **23.3%**	[0.5% is not greater than 1%] therefore **6.7%**	[2.0% is greater than 1%] therefore **0%**
	75%	**23.3+6.7+3.3=33. 3%**	[0.0% is not greater than 1%] therefore **23.3%**	[0.1% is not greater than 1%] therefore **6.7%**	[0.5% is not greater than 1%] therefore **3.3%**
		86.6%			

Summing across all revenue quartile and number of reports per facility combinations in Exhibit 5 indicates that overall, 86.6% of small companies are expected to incur cost impact percentages of less than one percent. This exercise is repeated to determine the percentage of small companies with impact percentages between 1% and 3%, and with impact percentages above 3%.

Step Five

Finally, in Exhibit 6 the number of small companies in each of the three impact categories is calculated as the percentage of companies with cost impact percentages in each category multiplied by the total number of small companies in this SIC code as estimated in Table D-2.

EXHIBIT 6

SIC Code XXXX					# of Small Companies w/ Impacts less than 1%	# of Small Companies w/ Impact between 1% & 3%	# of Small Companies w/ Impacts greater than 3%
# Fac.	Avg. Fac/ Co.	# Co.s	% Small	# Small Co.s			
200	2	100	60%	60	[86.6% x 60]= **52**	[10.1% x 60]= **6**	[3.3% x 60]=**2**

Table D-3 presents the estimated number of small companies in each impact category.

TABLE D-3
SUMMARY OF IMPACTS ON SMALL ENTITIES
LEAD AND PBT PROPOSALS
FIRST YEAR
PREFERRED OPTIONS

SIC Code	Estimated Number of Affected Entities	Estimated Number of Affected Small Entities	Estimated Number of Small Entities with Impacts of 3 Percent or Greater	Estimated Number of Small Entities with Impacts Between 1 and 3 Percent	Estimated Number of Small Entities with Impacts Less than 1 Percent
10	31	19	0	0	19
12	226	197	0	0	197
4911	112	29	0	0	29
4931	107	9	0	3	6
4939	25	6	0	3	3
4953	75	8	0	2	6
5169	13	10	0	0	10
5171	1,042	875	0	0	875
7389	98	31	0	0	31
20-39	7,992	5,434	0	20	5,414
Municipal Utilities	38	18	0	1	17
TOTAL	9,759	6,636	0	29	6,607
Percentage of Small Entities	—	100%	0%	0.4%	99.6%

Note: Due to rounding, calculations may not yield exact numbers.

TABLE D-3 (Continued)
SUMMARY OF IMPACTS ON SMALL ENTITIES
LEAD AND PBT PROPOSALS
SUBSEQUENT YEARS
PREFERRED OPTIONS

SIC Code	Estimated Number of Affected Entities	Estimated Number of Affected Small Entities	Estimated Number of Small Entities with Impacts of 3 Percent or Greater	Estimated Number of Small Entities with Impacts Between 1 and 3 Percent	Estimated Number of Small Entities with Impacts Less than 1 Percent
10	31	19	0	0	19
12	226	197	0	0	197
4911	112	29	0	0	29
4931	107	9	0	1	8
4939	25	6	0	2	4
4953	75	8	0	0	8
5169	13	10	0	0	10
5171	1,042	875	0	0	875
7389	98	31	0	0	31
20-39	7,992	5,434	0	4	5,430
Municipal Utilities	38	18	0	0	18
TOTAL	9,759	6,637	0	7	6,629
Percentage of Small Entities	—	100%	0%	0.1%	99.9%

Note: Due to rounding, calculations may not yield exact numbers.

SIC Code 4911 (Coal- and Oil-Fired Steam Electric Services)

This industry group was analyzed separately because of the nature of the SBA definition of a small business for this industry and because it was possible to identify the actual facilities expected to report under the modified reporting requirements. The SBA definition of a small business for this SIC code is four million megawatt hours (MWh) of electricity output annually. The analysis of this industry is based on a database of steam-generating power plants available from the Utility Data Institute (UDI).

To match the SBA size definition, which applies to the parent company and all subsidiaries, divisions and branches, it was necessary to aggregate the coal- and oil-fired power plants listed in the UDI database based on common ownership. Determining common ownership of these power generating facilities was accomplished by matching facilities listed in the UDI database with information in *Dun & Bradstreet's Market Identifiers On-line Database*, which provides a unique Dun's number for each location listed in the database and also indicates whether the location is a subsidiary, division or branch, or has a separate headquarters and/or immediate and ultimate parent. Some facilities in the UDI data base had no immediate or ultimate parent listed in the Dun & Bradstreet database. For these facilities, the owner listed in the UDI database was assumed to be the ultimate parent. By this method, all facilities sharing common ownership were aggregated under a single listing for the ultimate parent to the extent indicated by the data sources used. The 463 privately-owned electric utility facilities were associated with 112 parent companies, indicating an average of 4.1 locations per parent company.

Financial and employee size data for each parent company were obtained from *Dun & Bradstreet's Market Identifiers On-line Database*. There were 49 companies for whom annual revenues could not be obtained at the parent level from Dun and Bradstreet. Revenue information for these companies was obtained from other data sources, including *Ward's Business Directory of U.S. Private and Public Companies*, *1996 Directory of Corporate Affiliations*, and *Electrical World Directory of Electric Power Producers*, 104th edition.

The records were then sorted by annual production to determine the number of large and small companies based on the 4-million MWh SBA standard. For each parent company listing, the total estimated compliance burden was calculated based on the number of subsidiary facilities affected under the proposed rule and the number of reports expected from each facility.[76] The company-specific compliance cost estimates were developed using the estimated number of reports per facility presented in Appendix B.

The annual cost impact percentage (annual compliance costs as a percentage of annual revenues) was then estimated for each company as previously described. The cost impact percentages for each ultimate parent were classified into one of three categories as a measure of the potential regulatory burden: (1) less than one percent of annual revenues; (2) from one to three percent of annual revenues; and (3) three percent or more of annual revenues. Table D-4 presents the results of this analysis for the Preferred Option.

---

[76] The UDI data base includes only steam-electric generating facilities. Consequently, some parent companies listed may have additional non-steam generating capacity (e.g., hydro, wind) which should be included in their total annual production for purposes of determining if the company exceeds the SBA's 4-million MWh standard. This potential source of error would be expected to overcount the number of "small" companies in SIC code 4911.

Publicly-Owned Facilities

This analysis examines the potential impacts on small municipalities that own one or more coal- and/or oil-fired electric utilities. Electric utilities are the only publicly-owned facilities expected to be affected by the proposed lead and PBT rules. A total of 49 municipally-owned electric utility facilities representing 39 unique municipally-owned parent entities were identified from the UDI data (USEPA, 1997). When the proposed lead and PBT rules are considered together, 48 of the 49 municipal utilities are expected to report. These 48 municipal utilities are associated with 38 parent entities. The RFA defines a small governmental jurisdiction as having a population of less than 50,000 people. Population data for each municipality were obtained from *Electric World Directory of Electric Power Producers*, 104th edition, and from the *County and City Data Book: 1994*. Based on these population data, 18 small municipally-owned electric utility companies were identified, representing 21 individual facilities.

The number of reports for each electric utility was then estimated and compared against the utility's annual revenues. Annual revenue data were obtained from *Electrical World Directory of Electric Power Producers*, 104th edition. Revenue information was provided directly by four utilities for which published data were not available.[77]

Table D-5 summarizes the results for small municipally-owned electric utilities.

[77] Utility revenues were examined, in place of annual governmental revenues, because revenue data were not available for several municipalities. Using utility revenue to examine the potential regulatory burden on these entities is expected to provide a more conservative estimate of the potential impacts on these small entities because the utility revenues represent only a portion of the total annual revenues for a municipality. Thus, it can be assumed that the cost impact percentage based on total annual municipal revenues will be lower than estimated when comparing utility compliance costs to utility revenues alone.

TABLE D-4
ESTIMATED IMPACTS ON COAL- AND OIL-FIRED ELECTRIC SERVICES
LEAD AND PBT PROPOSALS
SIC CODE 4911
PREFERRED OPTIONS

Size Classification	Number of Companies	Average Number of Reports per Company	Range of Reports per Company	Median Annual Sales (Millions)	Companies with Impacts of 3% of Annual Sales	Companies with Impacts of 1%-3% of Annual Sales	Companies with Impacts < 1% of Annual Sales
FIRST YEAR							
Large (>4 Million MWh)	83	5	1 - 8	$1,367	0	0	83
Small (<4 Million MWh)	29	5	1 - 8	$181	0	0	29
Total	112						112
SUBSEQUENT YEARS							
Large (>4 Million MWh)	83	5	1 - 8	$1,367	0	0	83
Small (<4 Million MWh)	29	5	1 - 8	$181	0	0	29
Total	112						112

TABLE D-5
ESTIMATED IMPACTS FOR MUNICIPALLY-OWNED ELECTRIC UTILITIES
LEAD AND PBT PROPOSALS
SIC CODE 4911
PREFERRED OPTIONS

Size Classification	Number of Municipalities	Average Number of Reports per Municipality	Range of Reports per Municipality	Median Annual Sales[1] (Millions)	Municipalities with Impacts 3% of Annual Sales	Municipalities with Impacts of 1%-3% of Annual Sales	Municipalities with Impacts < 1% of Annual Sales
FIRST YEAR							
Small Municipalities (Pop. < 50,000)	18	4	1 - 6	$16.8	0	0	18
SUBSEQUENT YEARS							
Small Municipalities (Pop. < 50,000)	18	4	1 - 6	$16.8	0	0	18

[1] Median annual sales data is based on utility revenues, not total revenues for the municipalities owning the utilities.

D.1.5 SUMMARY OF SMALL ENTITY IMPACTS

This section summarizes the estimated impacts for small entities of the two proposals based on the results of the industry-specific analyses discussed in previous sections. Table D-2 presents the estimated number of affected small companies within each industry group and number of affected small municipalities. Table D-3 presents the estimated number of small companies and small municipalities falling into each impact category as well as the overall results for all companies and municipalities affected by the modified reporting requirements. As Table D-3 illustrates, when the two proposals are considered together, 6,636 companies and municipalities are affected. Of these small entities, 29 are expected to have impacts greater than or equal to one percent in the first year. None of the small entities will experience impacts of greater than three percent. In subsequent years, 7 small entities may experience impacts above one percent. None of the small entities will experience impacts of greater than three percent.

D.2 EFFECT ON ESTIMATED SMALL ENTITY IMPACTS OF CONSIDERING THE PROPOSED RULES TOGETHER VERSUS SEPARATELY

As described in earlier sections, a per parent company compliance cost is generated and then compared to company level annual revenues to estimate the small entity impacts. The company compliance cost combines information on the average number of facilities owned by companies in that industry group with information on the possible number of reports expected to be filed by each of those facilities. Within an industry group, parent companies of facilities filing multiple reports will have higher compliance costs than parent companies of facilities filing only one report. These companies will also have higher cost impact ratios.

Under the proposed lead rule, while parent companies may own multiple facilities, each facility is only expected to file one report for lead and lead compounds. Under the proposed PBT rule, parent companies may own multiple facilities filing as many as 15 reports (manufacturers). The average number of facilities per parent within an industry group does not vary across the two proposals. Similarly, unit per facility and per report compliance costs remain constant. Therefore, within an industry sector, the parent company compliance cost is usually lower under the proposed lead rule than it is under the proposed PBT rule.

When the two proposed rules are considered together, some of the facilities filing on lead and lead compounds would also be filing on one or more PBT chemicals. Thus, the parent company compliance cost would increase for some companies. Potentially, some of these parent companies could move from one cost impact category to a higher cost impact category. Therefore, adding the number of small entities in each impact category as shown in the respective economic analyses for the lead and PBT proposals will produce different results than those shown above.

LITERATURE CITED

1996 Directory of Corporate Affiliations (1996), volumes 1-5, New Providence: National Register Publishing, 1996.

"Directory of U.S. and Canadian Commercial Hazardous Waste Management Facilities," (1995), The Hazardous Waste Consultant. Elsevier Science Inc. March-April, 1995.

Dun & Bradstreet. Dun & Bradstreet's Market Identifiers On-line Data Base.

Dun & Bradstreet. Dun's Marketing Services Data Base. August, 1995.

Dun & Bradstreet. Dun's Marketing Services Data Base. March, 1998.

Electrical World Directory of Electric Power Producers (1995), 104th ed. New York: The McGraw-Hill Companies, 1995.

U.S. Department of Commerce, Bureau of the Census. County and City Data Book (1994). Washington, D.C.: Government Printing Office, 1994.

U.S. EPA. Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313 Reporting. April, 1997.

U.S. Small Business Administration 1998. Information from the Small Business Administration on the SBA World Wide Web site: http:\\www.sba.gov\advo\stats\us_ind95.html

Utility Data Institute. 1994 Production Costs: Operating Steam-Electric Plants (UDI-2011-95)(1995), 14th ed. September 1995.

Ward's Business Directory of U.S. Private and Public Companies, volumes 1-4 (1996). New York: Gale Research, Inc., 1996.